

NC200

Amstrad
Notebook
C O M P U T E R

<http://amstrad.cpc.free.fr>

User
friendly

Letter from the Chairman of Amstrad

Dear New Customer

I am first of all delighted to welcome you to the world of Amstrad, with your purchase of this new Notebook computer.

This product is known inside our company as one of my "BABIES". The background to its inception stemmed from my personal desire to be able to use a computer.

Yes - I am embarrassed to say that, as the Chairman of one of Europe's largest manufacturers of computers, I have never been able to use one! A while ago I called a meeting with some of my engineering staff and explained that I wanted us to make a simple to use computer. I explained that I am not interested in knowing what's inside the machine and what the specification of the machine is. I just want a machine that is simple to operate and understand.

After many months of development and many meetings in which I was asked to give my opinion on the simplicity of its operation, the first of this product type evolved. This product is the third of a long line of our generation of simple to use computers.

Although the Notebook is very simple to use, it should not be underestimated. I decided to write the first section (Section 1) of this instruction book to cover very simply the main functions for the first time novice user. The second section of the book has been written by the "BOFFINS" and uncovers a vast world of the machine's operation. If you still have any problems in understanding the Notebook, see page 460 for details of our telephone hotline support.

I am sure that if you have never used a computer before that once you have started to use the Notebook, you will be delighted with the results - so remember that it was AMSTRAD that put you in touch with the world of computing.

If you are delighted with your new skills, please show them off and recommend a friend or colleague. Help us to make AMSTRAD the entry-level computer standard.

Yours sincerely



Alan Sugar
Chairman

SECTION 1

The best way to follow this section is to read a bit and then do a bit! Have the machine in front of you and read carefully step-by-step.

Take your time.

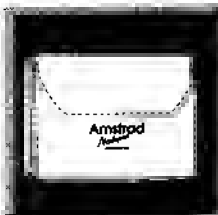
Setting Up

STEP 1:

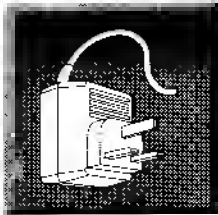
Unpack the box and check you have the following items:



**NOTEBOOK
COMPUTER**



BAG



**MAINS
ADAPTOR**



**THIS
BOOK**

STEP 2:

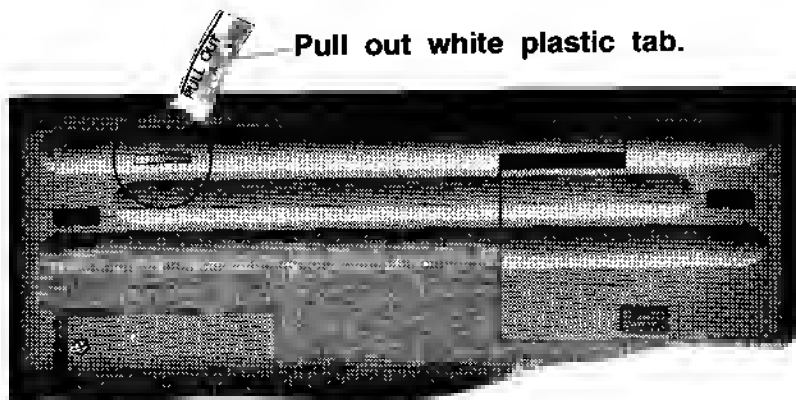
PLEASE FILL OUT THE WARRANTY CARD AND SEND IT OFF.

This will enable us to mail you from time to time on updates and improvements to your new Notebook.

PLEASE KEEP ALL PACKAGING MATERIALS - BOX, STYROFOAM ETC IN CASE YOU NEED TO TRANSPORT YOUR UNIT.

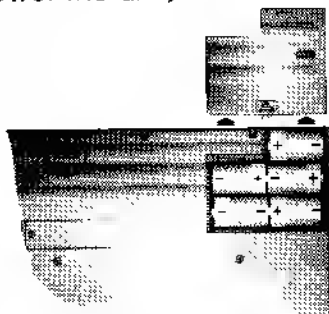
STEP 3:

To set up the Notebook, turn the unit face down and pull the white plastic film so that it comes COMPLETELY out of the Notebook.



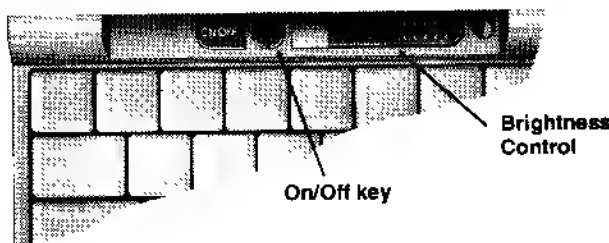
STEP 4:

Remove the main battery cover and insert five C cell batteries, as shown below (alternatively you may choose to use just the supplied power adaptor to power the unit):



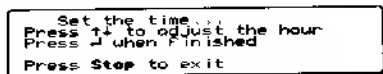
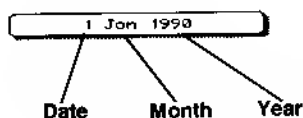
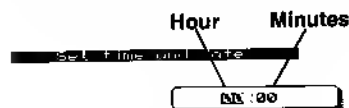
STEP 5:

Put the battery cover back on and turn the Notebook face up and open it so you can see the keyboard and screen. Then press the ON/OFF key (Under hinge of display). See diagram below.



The machine should make a "bleeping" sound and the screen will come on.

The screen display should be as below. If not, adjust the Brightness control (slider next to the On/Off switch):

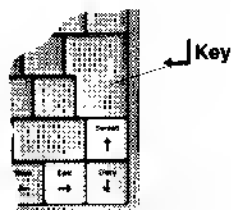
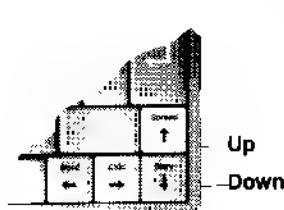


To set today's time and date, turn to the next page.

STEP 6:

words the top left of the screen you will see a small dark section over the two zeros 00, these are the hour digits.

Set today's current hour by pressing the up or down keys (↑ ↓ (you will use these keys many times in future so remember them)). Watch the screen while you are pressing the keys.



The Notebook is set to operate as a 24 hour clock. So, for example, set 5pm as 17 or 9am as 09.

locate the (←) key (you will use this key many times in future so remember it!) See diagram above and press it ONCE ONLY.

The small dark section is now over the minutes digits so use the (↑ ↓) keys to set the minutes. Watch the screen while you are doing • Once you have set the minutes, press the (←) key.

The small dark section is now over the date digit, so use the (↑ ↓) keys to enter in today's date in the month. Once you have set this, press the (←) key.

The small dark section is now over the month section, now use the (↑ ↓) keys to select this month, once you have selected this month, press the (←) key.

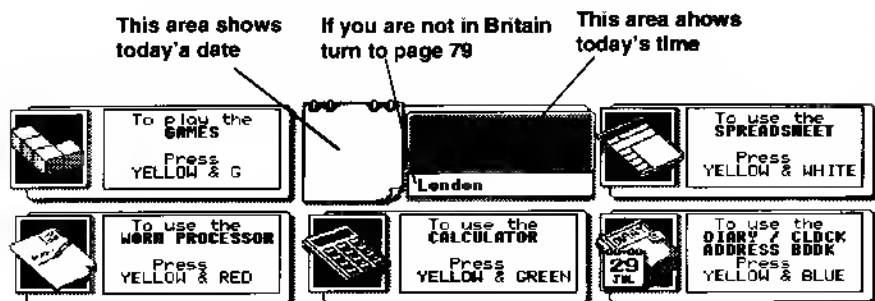
The small dark section is now over the year digits, now use the (↑ ↓) keys to select this year. Once you have selected this year, press the (←) key.

If you make a mistake, hold down the YELLOW key, then press the BLUE key. now press the BLUE key on its own. Finally press the WHITE key and start again. To adjust the time due to summer/winter one hour changes, see setting date and time in section 2. IF YOU HAVE ANY PROBLEMS, SEE PAGE 460 FOR DETAILS OF OUR TELEPHONE SUPPORT.

CONGRATULATIONS!

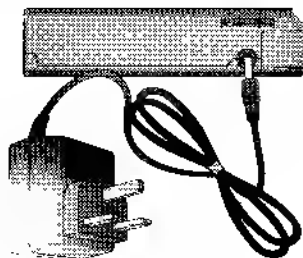
- You have now set up your Notebook.

This is how the screen should now look:



Using the Notebook with the Mains Adaptor

When you use the Notebook at home or at work, we recommend you use it with the Mains Adaptor provided. Simply plug the Mains Adaptor into any 240V 13 Amp wall socket and plug the lead into the back of the Notebook. Place the Notebook close to the socket to avoid unnecessary strain on the lead.



NEVER use other power adaptors - only use the Mains Adaptor supplied with the Notebook.

When you have finished using the Notebook, we recommend the adaptor is removed from the wall socket and the cable is removed from the rear of the Notebook. (Remember to switch off before removing the lead from the back of the Notebook).

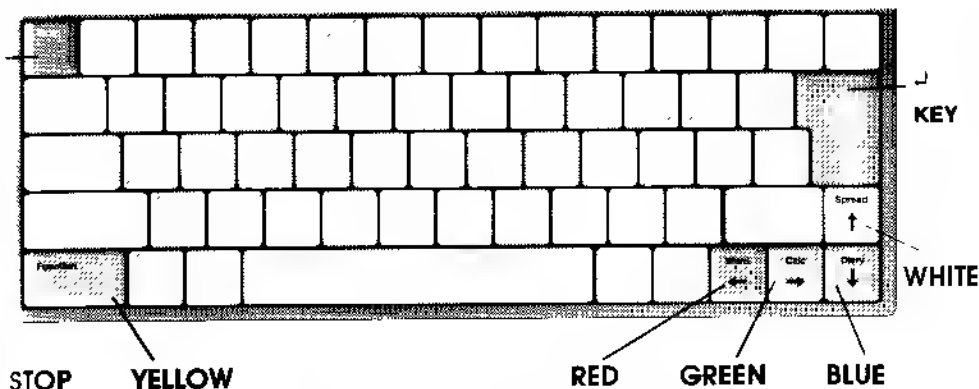
NOW THE CLEVER STUFF!

Using the Notebook

STEP 7:

The first thing to do is to familiarise yourself with the seven most commonly used keys.

These keys will be referred to throughout this section of the book as:



In some cases you will be asked to press both the Yellow and Red keys, the Yellow and Green keys, the Yellow and Blue keys or the Yellow and White keys. The best way to do this is to press and hold down the Yellow key first with one finger followed by the other coloured key with another finger.

After pressing the POWER ON key any time in the future, you will generally return back to the screen shown below. There are five main function areas or sections together with the date and time display. We shall refer to this in future as the MAIN SCREEN.



STEP 8:

To use the Calculator

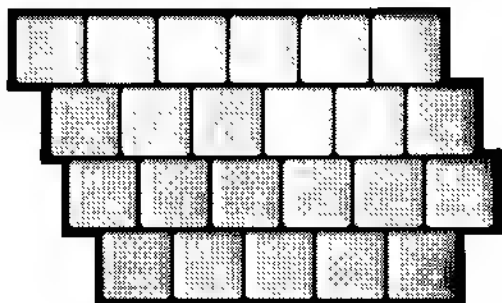
Most of us know how to use a calculator. As this is an easy function for most of us to understand, we shall start with this section first of all.


STEP 9:

Do as the centre panel of the main screen says - press the Yellow and Green keys AT THE SAME TIME.



As you can see from the new screen message above, you are invited to use the green numbers/characters on the keyboard. To use the calculator, use only the keys with green characters. No others will have any effect.



We assume you are familiar with the functions of a calculator and so we have no more to say in this section other than to advise you how to get back to the main screen. When you have finished using the calculator, simply press the  key (top left corner).

If you leave the Notebook switched on without using the keyboard for more than five minutes, it will automatically switch off. Simply press the power key and the screen will return.

Using the Word Processor

For those of you who have used a typewriter or computer before we apologise now for boring you. Throughout this section of the book we are assuming the user is a novice.

After returning to the main screen or switching on the Notebook again the main screen will appear.



To use the word processor section simply follow the Instructions on the screen and press the Yellow and Red keys.

This operation will bring you to a new screen as below:




The first message on the left is to start a new document, so we will use this first of all and ignore the other two messages for the moment. Follow the instructions and press the Red key ONLY.

After pressing the Red key, the next screen (as shown below) will invite you to give the new document/letter a name. The reason for giving it a name is so you can identify it amongst a list of many documents you will produce in the future.



Please type a name for the new document and press ↵

Follow the instructions and give the document a name by typing it in. For example, let's call this document **first**. Simply type in **first** by pressing the F I R S T keys on the main keyboard and press the  key (REMEMBER WE TOLD YOU YOU WILL USE THIS KEY A LOT).

As you will see from the new screen below, the dark line at the top shows the Document Name, and also that you are on page 1.



In the left corner on the second line you will see a rectangular shaped black flashing on and off. This item is called a CURSOR. Remember the word CURSOR - we will refer to it many times in the future.


You will also see the message:

← Start typing new text here

As soon as you hit any key this message will go away.

STEP 11:

Before we go any further you will need to learn some simple principles to do with typing. (For those who already know it all - SORRY.)

Press the  key five times. You will see the cursor move down the screen.

Now locate the keys shown below:



As you will see, they all have arrows on them, pointing in different directions.

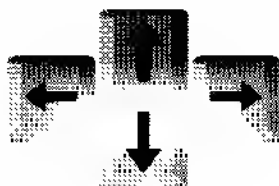
Press the Green key four times and you will see the cursor move to the right.

Now press the [↑] key four times and you will see the cursor move to the screen.

Now press the Red [←] key four times and you will see the cursor move to the left.

Finally, press the Blue [↓] key four times and you will see the cursor move down the screen.

Now you imagine a cluster of arrow keys as shown below the cursor will move in the direction of the arrow you press.

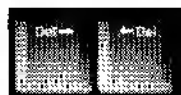


Now type in the following:-

amstrad


You will see the cursor is flashing at the end of the word.



Now locate the [Del] [Del] keys shown below (top right corner).



Press the [Del] key three times and you will see three letters disappear (The Boffins say were DELETED. Got it? Del is short for DELETE).

Press the Red  key four times and you will see the cursor is now over the letter a

Now press the  key four times and you will see the remaining four letters are deleted.

You can imagine now that all letters LEFT of the cursor will be deleted when you press the  and all letters RIGHT of the cursor will be deleted when you press the  key.

Now type in the word:

amstrad

Then locate the large bar at the bottom of the keyboard as shown below (*This is known as the space bar*).



Press the bar once and you will see the cursor jump to the right of the word **amstrad**.

Now type in:

notebook

You will see the two words are now spaced apart.

Any time you wish to space words apart, simply use the space bar.


Now you have experienced these features it's time to write your first document.

Press the  key and hold it down to clear the screen.

Now off you go - DO IT!

Why don't you type in:-

this is the first time i have ever used a computer

You will now see the CURSOR flashing at the end of your sentence.
Now press the  key (you must remember this key by now!) and
now type in:-


**this is the second line of the first document i have ever written on a
computer**

As you can see, what you have written on the second line was too
much for one line and it has overlapped onto the third line.

Now press the  key (top left corner).

CONGRATULATIONS!

- you have written your first document on a computer.

To write a second document, press the Red key and once again
type in a name for the second document. Let's call this one
second. Don't forget to press the  key (that key again!)

Now type the following:

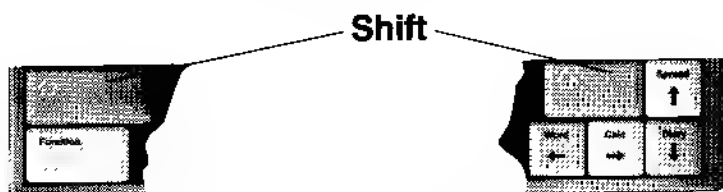
i seem to be getting good at this now

Once again press the  key.

Now type:

**i have noticed there are no capital letters in
my sentences**

It is true - so far everything you have written is in lower case letters (Boffin talk for non capital letters). On the keyboard locate the keys shown in the diagram below. These are known as the SHIFT keys.





Press the  key.

Now hold down either of the above shift keys with one finger and type the following with another finger:

THIS LINE IS ALL IN UPPER CASE

(Upper Case is Boffin talk for Capital letters)


Press the  key again.


This time type in the following sentence but put capital letters (upper case) and lower case letters where they are expected to be. Do this by holding down a SHIFT  key only when you wish to type a capital letter, and release the SHIFT  key when you type lower case letters.

Now I am getting quite good on this Notebook

Press the  key again.

Look at the dark line at the top of the screen and you will see it says **Press STOP to finish or print.**

It should be noted at this time that the  key (top left corner) is going to be a very good friend to you, as pressing it will always take you out of what you are doing and back to the previous screen.

So press  now, then press it again. You will see you are now back at the original main screen.

Now press Yellow and Red (at the same time). As you will see, you go back to the main screen in the word processing section. You have used the Red key message to the left to write two documents and we have so far ignored the other two messages.

EP 13:

We will now explore the middle message so press the Green key as tasks.



The screen shows a list of the two documents you have written. Locate the (↑) (↓) keys (bottom right corner).

By pressing the White (↑) key you will see the dark band move from the word **second** onto the word **first**.

By pressing the Blue (↓) key once you will see the dark band move back to the word **second**. If you have lots more documents in the notebook you can move the dark band up and down this screen with the (↑) (↓) keys to locate on any of your document names.




Move the dark band back over the word **first** then press the (→) key (yes - me again!) and you will see your first document appear. Now press the (stop) key (life saver) and you will come back to the main word processor screen.

Press the Green key again and this time move the dark band down over the word **second** by using the Blue (↓) key and then press the (→) key and you will see your second document appear.

Press the Blue (↓) key four times and read on.

Some Useful Tips

Now you can practise writing a new document. After reading these tips, go back to page 7 and do it all again, but this time write what you want, call the documents what you want and generally find your way around these areas. Remember, the (stop) key will bring you out to the previous screen message.

One other tip to remember is that by using our good old friend the  key you can skip lines and space out your sentences in any document you wish to write. For example, as soon as you get into the new document section where the cursor is flashing in the corner and you are invited to ← **Start typing new text here** you can press the  key a few times first. This will mean that when you finally print out your document the writing will not start right at the top of the page/paper. Similarly, after you have typed in a few lines, if you want to space the next paragraph away from the first, you can use the  key. Try it now!



Another useful tip is if you wish to type everything in capital letters and you don't want to hold your finger on the SHIFT key all of the time, simply press the key marked CAPS LOCK once (*third from the bottom on the left*) and everything you type will appear in upper case letters (*capitals*). A letter "C" appears at the top right of the screen when you have switched Caps Lock on.

To get back to normal lower case use just press the  key once again.

The final tip is to advise you how to use the characters which are printed above the number keys on the top row of the keyboard, or indeed how to use any character that is printed on the top of a key.



These can be used by pressing the SHIFT key with one finger and pressing the character you wish to use with another finger.

For example, let's say you wish to use the & sign, which is located above the figure 7 on the top row of the keyboard. Simply hold down the SHIFT key, , with one finger and press the &/7 key, , with another. Do this a few times. Now release the SHIFT key and press the &/7 key again and you will see it prints 7. Holding down a SHIFT key makes another key print the character shown on its top section.

Now press the  key twice to exit to the main screen.

If you leave the Notebook switched on without using the keyboard for more than five minutes, it will automatically switch off. Simply press the power key and the screen will return.



So far the instructions you have been given for the word processor section have been very basic. There are many other functions and wonderful things that can be done within this section. All of the features of the word processor are explained in greater detail in the second section of this book.

If you have any problems, see page 460 for details of our telephone hotline support.





STEP 14:

Using the Spellchecker Dictionary

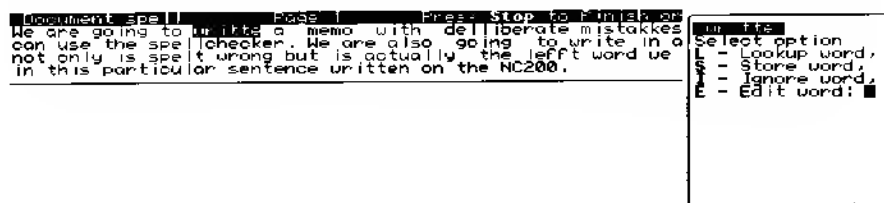
Inside the micro chips and memory of this machine there is a 48,000 word dictionary and function which allows you to check if you have spelt words correctly. This facility also allows you to spell a word correctly whilst you are in the middle of writing a document.

To demonstrate the spellchecker and dictionary function, return to the main screen by pressing the  key. As usual press the Yellow and Red keys together, followed once again by the Red key only and type in the name of this new document **spell** and press the  key.

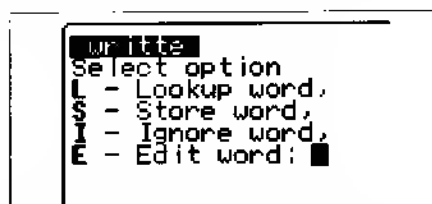
Now type in the text shown below, which as you can see has many spelling mistakes. Please type it in exactly as you see it below and do not alter it at all.

Document:  File:  Press  to finish or print. 
We are going to write a memo with deliterate mistakes so that we
can use the spellchecker. We are also going to write in a word which
not only is spelt wrong but is actually the lefft word we mean to use
in this particular sentence written on the NC200.

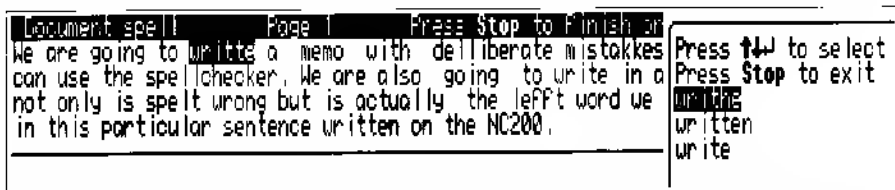
Now place one finger on the Yellow key and press the 1 key located next to the **[S100]** key. You will now see the screen as shown below.



On the right-hand side of the screen you will see the word **writte** highlighted in a dark bar. On the left-hand side of the screen you can see the same word **writte** also highlighted. This is the first mistake in your document. What the spellchecker is doing is asking you a list of questions which can be seen on the right-hand side of the screen.





Obviously this is an incorrectly spelt word and the first question **L** invites you to look up a word which you meant to use. Therefore press the letter L on the keyboard. As soon as you press the letter L you will see on the right-hand side of the screen that the Notebook is looking for words which are similar but spelt correctly and as you can see from the display below, the Notebook has given you a choice of three words which it thinks you really meant to use.

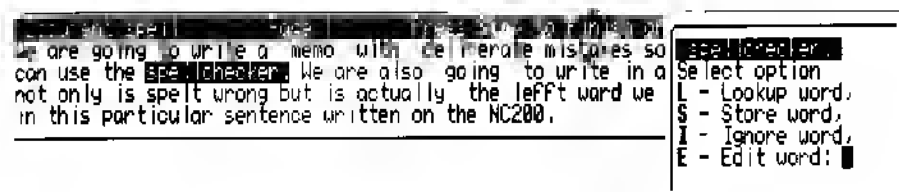


Obviously we meant to use the word **write**. By using the Blue **[↓]** key you can move the dark bar down onto the word **write**. Once you have done this press the **[↵]** key. You will notice on the left-hand side of the screen in your document the word **write**

has been corrected but a new incorrectly spelt word has been found.

Once again press the letter L to look up the word. As you will see, the Notebook has found the correct spelling of the word **deliberate**. Once again press the  key. You will see the word **deliberate** has been corrected in your document and the Notebook has found another spelling mistake. Once again, press the L key and as you will see, the Notebook again finds the correct spelling so press the  key again to correct the word in your document.

You will now see from the diagram below that the Notebook has stopped on the word **spellchecker**.



You may be wondering why it has stopped on this word, as clearly it seems to be spelt correctly. The reason for this is that *spellchecker* is not really a word usually found in a dictionary. It is a name given to something, similar to your own name or your company's name which, of course, you would not expect to find in a dictionary. However, the dictionary inside the Notebook will always stop on things that it cannot recognise. Two of the questions on the right-hand side of the screen; **S - Store word** or **I - Ignore word** can be used in these circumstances. If the word *spellchecker* is something very common to you and you are always going to use it in your documents in the future, then what you can do is to store it in the memory of the Notebook so that if you ever use it again the Notebook dictionary will ignore it if it is *spelt correctly*.

Let us in this instance decide to store the word *spellchecker* in the "user dictionary" for future use. Press the letter S. The word *spellchecker* has now been stored in the dictionary. If you ever use it again in one of your documents it will be ignored if *spelt correctly*. This facility is very useful if you are going to use a name or term many times in your documents which is not normally found in a dictionary.

As you will see, the spellchecker has now found another incorrectly spelt word (**lefft**). However, when we wrote this sentence we did not really mean to use this word. Not only is it spelt incorrectly but it is not the word we wanted to use. In this case you can use the question on the right-hand side **E - Edit word**. Press the **E** key. As you will see the cursor is now at the start of the word **lefft**. By using the **[Del]** key, delete the whole word **lefft** and then type in the word **wrong**, then press the **[Enter]** key.

Finally, you will now see that the Notebook has found **nc**. The reason is obvious - this is the prefix of a model number of the Notebook (NC200) and no-one would expect to find this in a dictionary. You may decide that you wish to refer to this prefix many times in future documents that you write, in which case you can decide to store it in your user dictionary by pressing the **S** key as we did before with the word *spellchecker*. However, it is unlikely that you would wish to use a model number such as this again and therefore you can simply advise the Notebook's spellchecker to ignore it by pressing the **I - Ignore word**. As you will see, after pressing **I**, the Notebook's spellchecker has completely checked the entire document.


As usual, press **[Stop]** to exit and press **[Start]** again to return to the main screen.

If you have any problems, see page 460 for details of our telephone support

STEP 15:


Using the Spellchecker to assist you in spelling a word correctly whilst writing a document.

It is annoying sometimes when you are writing to find that you have forgotten how to spell a certain word. The next demonstration will show you how to use the Notebook's spellchecker to assist you in finding the correct spelling of a word whilst you are writing a document.

Starting from the main screen, press the Yellow and Red keys together, followed by the Red key only. Type in a name for the new document; let us use **howspell**, then press the  key as usual.


Type in the following text:



The library has many versions of the encyclopaedia

For those clever ones amongst us, you will see from the above that we have indeed spelt the word **encyclopaedia** correctly. There are, however, those of us that are not so confident in our ability to spell correctly. With the cursor flashing at the end of the word **encyclopaedia** hold down the Control key with one finger (*the Control key is next to the Yellow key on the bottom row of the keyboard*) and press the 1 key (*next to the  key*) and you will see that the top (dark) line of the screen states - **Word is in dictionary**. This means that the word is spelt correctly and, therefore, you can simply carry on typing.

Now carry on typing and add the following (*exactly, do not alter*):-

There does not seem to be enough space to accomodate

Once again, for those of us who are not so sure, the word **accomodate** may be spelt incorrectly. With the cursor flashing at the end of the word **accomodate** hold down the Control key with one finger and press the figure 1 key. As you will see from the screen, the word has been picked up by the Notebook's spellchecker as incorrect. Simply press the letter L to look up the correct spelling of the word. When the Notebook has found the correct spelling of the word, press the  key. The word **accommodate** has now been corrected and you are able to continue typing the rest of your document.

As usual, press the  key to exit and press the  key again to return to the main screen.

We suggest that you experiment in this area and we are sure that you will find the spellchecker section a great help in the future use of this product.

STEP 16:

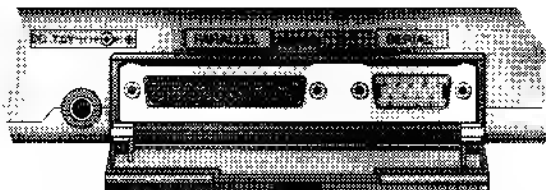
How to print out your Documents

The matter of printing out documents can become very complicated and is covered in much more detail in the second section of this book (page 119). **This may be obvious, but we'll say it anyway (Sorry). To print a document you need a printer.**

Unfortunately you cannot use the printer supplied with the Amstrad PCW range of computers.

These days, most printers have a socket on the back of them named PARALLEL.

You will see on the back of the Notebook that it also has a **PARALLEL** socket.



With the Notebook switched off the first thing to do is to connect the Parallel socket on the Notebook to the Parallel socket on the printer with a cable (*known as a printer cable, usually included with a printer*).

To progress any further the next advice is maybe also obvious but we will say it anyway! SORRY AGAIN.

Make sure the printer is switched on with paper in it and it is set up ready to print, according to the manufacturer's instructions.

Once connected to the printer press the Notebook's On/Off key.

Then press the Yellow and Red keys, followed by the Blue key and your list of stored documents will appear as you will see from the screen below:

```
To Print use ↑ ↓ ← → and press ↵  Menu For options  Stop to exit
First
second
spell
```

Using the (↑) (↓) keys, move the dark band over the document you wish to print and press the (→) key.

Your document will now print out on the printer.

Press the (Stop) key twice to return to the main screen.

GENERAL NOTE

One of the virtues of the Notebook is that it is portable. This means you can take it with you wherever you go. In most offices or hotels in Britain or, indeed, anywhere in the world, printers are used. When visiting you can simply plug the Notebook into most printers and print out what you want there and then.

IF YOU HAVE A PROBLEM PRINTING WE SUGGEST YOU CALL OUR HOTLINE. SEE PAGE 460.

STEP 17:

What floppy disks are used for:

You now have several documents stored in the memory of the Notebook. You will find that if you switch off the Notebook, next time you switch on they are still there. This is one of the great things about the Notebook. At any time, such as when the phone rings, you can switch off, safe in the knowledge that the information you have written so far will be safely held in the Notebook's memory until the next time you turn on again.

However, the memory within the Notebook is limited. When you first start to use the Notebook there is enough free memory to store about 110,000 characters. As you keep on writing new documents this memory will eventually get used up.

This is not a problem because you can easily take copies of the documents from memory on to a floppy disk. Then you can delete the originals from memory to make space for new documents. When you later need to work on those documents they can just as easily be copied back from the floppy disk to memory. Once a document is copied back to memory it can then be worked on just as before.

The 3 1/2" disks used with the Notebook have their information recorded in the same format as used by the MS-DOS operating system on IBM PC compatible computers. This means that documents you copy from the Notebook memory to a floppy disk have a secondary advantage in that they can easily be read into other programs on another computer that reads MS-DOS compatible disks. Documents from a PC can also be read back into the Notebook.

One further advantage of copying documents from the Notebook memory to a floppy disk is that documents stored on disk will be remembered for many years unless you choose to delete them. Documents in the Notebook's own memory are only stored as long as the batteries are connected. If they go flat or something happens to make them lose contact it is possible that documents in the Notebook memory could be lost. By copying them to floppy disk you will always have a copy to return to if such a disaster should happen.

This last point is so important that we would suggest you copy your work in progress to a disk at the end of every day (at least, perhaps even more often - every hour, say). Even if your Notebook were damaged or stolen the worst thing that could then happen is that you have lost one day's work. Copying your documents to a disk will only take a couple of minutes each day and could save you many many hours, even days, of lost work.

It's not just documents from the word processor that can be copied to disk. You can do the same with worksheets from the spreadsheet program that you will learn about in Section 2 of the manual. You can even copy your address book and diary information. These are all described in Section 2 of the manual.

As there is more than just documents that can be stored on a floppy disk, there is a more general word used to describe each item held on a disk: the word is FILE. When talking about the word processor we always use the word "document" to mean the pieces of text that you work on because it is a more meaningful word, but you will see the word "file" used as well and normally it will mean the same thing.

Preparing floppy disks for use - Formatting

Before you can copy information from the Notebook memory to a floppy disk there is one vital process that must be performed on the floppy disk before it can be used. It must be **FORMATTED**. This process must be performed once on each new disk that you buy. During formatting the completely empty space on the surface of the disk is divided up into neat little "pigeon holes" that the computer later uses to store the information in.

Technical note: The circular surface on each side of the disk is divided into 80 tracks and each of those tracks is divided into 9 sectors ("pigeon holes"). Each sector can hold 512 characters so the total storage space on a floppy disk is 737,280 characters - In computing terms this number will often be referred to as 720 Kbytes or just 720K. ($80 * 2 * 9 * 512 = 737,280 = 720 * 1024$)

Note: there is a second type of $3\frac{1}{2}$ " disk used on PC computers. These are called "High Density" disks and have 18 sectors per track instead of just 9. This means that their total storage capacity is 1,474,560 characters (also known as 1.44MB). The Notebook cannot read or write this type of disk. High Density disks are usually identifiable by having an "HD" logo on the disk. They also have a hole punched through them in bottom right corner of the disk.

As well as preparing brand new disks, you can use the formatting process to completely erase everything that has previously been stored on a floppy disk. This can be quite useful to quickly remove all documents from a disk but you can also see that it could be quite dangerous - you might inadvertently erase hundreds of documents that you had stored on disk. Be careful when formatting disks - be sure that you are formatting the disk you intend to.

To format a new floppy disk ready for use proceed as follows:

Place a disk (not supplied) in the drive of the NC200. Insert it, metal shutter first, through the drive door at the right hand end of the Notebook. The disk should be inserted label uppermost (the central metal spindle of the disk should point downwards).

Push the disk in until it clicks into place. The disk eject button at the top right corner will click out - you can later press this button when you want to remove the disk from the drive.

From the front screen of the Notebook press Yellow and Red keys together to access the Notebook's Word Processor menu.

Then press the Green key on its own to select the List Stored Documents option. Once the list of stored documents is showing on screen press the **MAIN** key.

Document operation menu (Main)

```
F - File
- Insert
D - Delete
- Print
R - Rename
- (space) to mark
C - Copy marked files to disk
- List disk files
F >> Formatting and export functions ...
T >> Transfer Functions (Lapcat) ...
```

Towards the bottom of the list of options that appears you will see the entry **F >> Formatting and export functions...** You can press the Blue, **(↓)**, key 8 times followed by the **(←)** key to select this option but a quicker way is to just press the **F** key on the keyboard to immediately select this option.

Formatting and export functions menu (Main)

```
F - Format disk
A - Export marked files as ASCII
W - Export marked files as Wordstar
```

You will now see a further list of options. The one we want to use is **F - Format disk**. Just push **F** again to quickly select this option.

You are now asked if you really want to format the disk in the drive. Only press **Y** to start the formatting process if you are absolutely sure that there is nothing on the disk that you might want to keep.

If you change your mind, press **N** to stop the formatting process. Once formatting has begun anything that was previously on the disk will be totally obliterated.

Once you press **Y** the formatting process will begin. You will see the track number count up from 0 to 79. When it is complete you should see the following message:

The disk is now Formatted and ready for use
Press **Stop** to exit ...

Just press **Stop** after you have read this message.

STEP 19:

Copying files (documents) to a disk

Now that you have a formatted disk you are ready to copy files to it. You should currently be at the List of Stored Documents.

If necessary, use the White (**↑**) key to move the dark band to the top of the list so that **first** is highlighted.

Press the space bar on the keyboard. Notice that the dark band moves to the second name in the list and, at the same time, the name "first" is written in **bold** type.

Keep pressing the space bar and you will see that each name is written in bold and the band moves down the list.

When it gets to the bottom of the list you will see that the last entry is written in bold and the dark band stays over it.

Move the dark band back up the list using the White (**↑**) key until it is over the document called **howspell**. Press the space bar once more. This time the entry is written back in normal text.

Each time you press the space bar on a name it switches between normal and bold text. A document name that is written in bold text is said to be "marked".

Currently you have three files marked (first, second and spell). Now press the **Menu** key. The following menu appears:

```
THIRD 2ND 1ST 0
1 - Insert
2 - Delete
3 - Print
4 - Rename
5 - (space) to mark
6 - Copy marked files to disk
7 - List disk files
8 - Formatting and export functions ...
9 - Transfer Functions (Lopcat) ...
```

You want to use the **C - Copy marked files to disk** option so just press the **C** key.



You will now be asked to confirm that you want to proceed with this copying operation. The copying operation will always overwrite documents of the same name that have been stored on the disk already.

You could press **N** to stop the copying operation if you realised that there were older copies of the document on disk that you wished to keep (they can be renamed before the copy option is used - see instructions in Section 2).

As we haven't copied anything to the disk yet it is safe to press **Y** the copying process will start. The name of each document will be printed as it is copied. Finally you will be returned to the list of documents stored in memory.

You will now have copies of your documents both on disk and in the Notebook's memory. In a minute we'll see how to list what is on the disk.

Suppose you decided that you had now finished working on the documents called **first** and **second**. You can delete them from memory, safe in the knowledge that you still have copies stored on disk.

To delete them, you should position the dark band over each of these document names in turn and press either  or . For each you will be asked to press **Y** to confirm that you want to delete the document.

There is a quick way to delete a group of documents. This is explained in Section 2 of the manual.

STEP 20:

Listing files on disk and copying back to memory

In the previous step you copied three files to the floppy disk and then deleted two of them from memory. Suppose you now want to check which files are stored on disk and copy one back to memory to continue working on it - simple!

From the list stored documents screen that is currently showing press **Second** once more. The now familiar menu appears again:

document operation second

```
I - Insert
D - Delete
P - Print
R - Rename
C - Copy marked files to disk
L - List disk files
F * Formatting and export functions ...
T * Transfer Functions (Lapcat) ...
```

This time press the **L** key to select **L - List disk files**. You will then see a screen similar to this:

```
Free 709K Dir: \NOTEBOOK 4 F 12:
PARENT
FIRST      133  15-06-93 11:48
SECOND     181  15-06-93 11:49
SPELL      271  15-06-93 11:50
```

The first part of the top line shows you how much free space is available on the disk. (1K = 1024 characters so 709K means $709 * 1024 = 726,016$ characters).

The part, which says **Dir: \NOTEBOOK** is not really important unless you are going to use the stored information on another computer (this is explained in Section 2 of the manual).

Each file stored on disk is listed with its name followed by the number of characters it contains and the date and time when it was created or last edited on the Notebook.

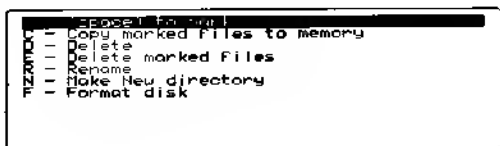
At the top of the list is an entry called **(PARENT)**, once again, this is not important to understand unless you will be copying files to another type of computer (see Section 2).

Press the Blue **[↓]** key and you will see that, just like on the list of documents stored in memory, you can move the dark band onto any of the names. If it is more than 30 seconds since the files were listed you may have noticed that there was some delay before the band moved. This is normal, it is because the floppy disk motor had been switched off to save battery life. When ever you press a key on the list of disk files screen, the motor will be switched on again if it was off. This operation takes a few seconds.

Move the band down to the file called **SECOND** and press the space bar.

Just like on the list of documents stored in memory you can mark names on disk by pressing the space bar. Pressing it again over the same name would un-mark a file name.

With the name **SECOND** showing in bold text press the **Macro Menu** key. The Disk Operations menu will appear:



It probably won't come as much surprise to see that there is an option **C - Copy marked files to memory** this is just like the **C - Copy marked files to disk** option that we used before.

Press the **C** key now and then **Y** to confirm the operation.

After the copy operation is complete you will be left with the list of documents on disk showing on screen. Press **Stop** to return to the list of documents stored in memory.

The file **SECOND** has been successfully retored to memory from the disk and you can now move the dark band over it and press **Enter** to edit it. Press **Enter** when you have finished.

Notice that when the file was originally written it was given the name "second" but now it has the name "SECOND". The name was actually changed to upper case when it was first copied from memory to disk.

The reason for this is that in order for the floppy disks to be MS-DOS compatible (for use on other computers) the document names used within the Notebook must be restricted to match with MS-DOS file name conventions. This means that all characters are converted to upper case, some special punctuation characters and spaces will be removed or converted to underline characters and, if a name is more than eight characters long, it will have a full stop inserted at the ninth character and all subsequent characters will be moved one position to the right, the twelfth character being last.

As you've seen, when such an amended name is copied back to the Notebook it retains the name it had on disk - it does not revert to the name that was originally given to it on the Notebook.

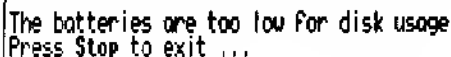
Summary

To summarise the use of disks: Floppy disks must be formatted before use. When you first access the List Stored Documents screen it shows the documents held in the Notebook's battery backed up memory. The Space bar is used to mark file names. Marked files can then be copied to disks. The files on a disk can be listed. Once this list is shown on screen entries can also be marked. Those marked files can then be copied back from disk to memory.

STEP 21:

Floppy disk drive battery usage

The disk system uses a lot of battery power to operate and it is probably best to try and use it only when operating from the mains adaptor to prolong battery life. The batteries may reach a stage at which there is still plenty of power to run the Notebook for many hours but insufficient to operate the disk system. You will see a warning message if this is the case when you try to use the disk



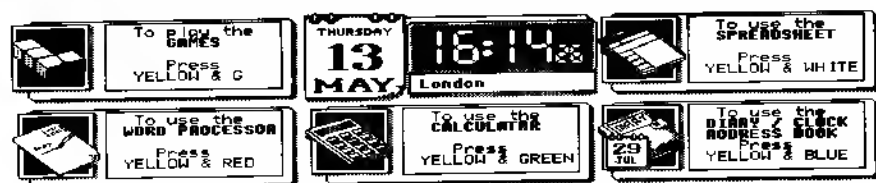
The batteries are too low for disk usage
Press Stop to exit ...

To give you an idea of relative power consumption. If normal consumption is when the Notebook is switched on but the back light and floppy disk are not used, consumption increases to three times normal level when the back light is on. Consumption increases to twelve times normal when the floppy disk is being used and consumption is fifteen times normal when both back light and floppy disk are used together.

STEP 22:

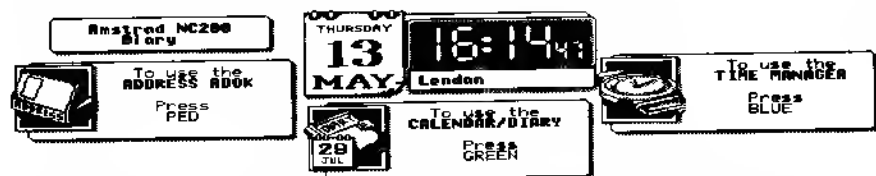
Using the Diary/Clock/Address Book Section

So far we have used the word processor and calculator section on the main screen.



Now we will explore the next section on the main screen, the Diary/Clock/Address Book section.

As directed by the main screen, press the Yellow and Blue keys. You will now see the new screen as shown below.



You will notice that the new screen is broken up again into three main sections. For the purpose of this exercise we will concentrate first of all on the Address Book section. The Notebook has a section within it that allows you to store names and addresses, telephone numbers, fax numbers, and car phone numbers of all your associates, relatives, companies etc.

STEP 23:

Using the Address Book

Press the Red key as indicated. You will see from the display below the new screen which should be considered as a blank page in your address book.

Address book		London	Thu 14 Nov 1995	15:15:13
Name				
Address				
Home Tel				
Office Tel				
Fax				
Mobile Tel				
Memo				

Add/Edit address

Press **↑↓** to move

Press **Stop** to exit

As you will see, the dark cursor is positioned in the top left-hand corner of the page next to the section marked **Name**. Let us now enter an example name and address so follow these instructions.

With the cursor in the top right-hand corner, type in:

Amstrad plc

and press the **↵** key

Now type in:

169 Kings Road

and press the **↵** key

Now type in:

Brentwood

and press the **↵** key

Now type in:

Essex CM14 4EF

and press the **↵** key again.


You will notice that the cursor is now sitting under the **E** of **Essex**. In this case there is no **Home** telephone number so press the **↵** key twice. You will now see the cursor is in line with the word **Office Tel**.

Now type in:


0891 808181

and press the  key to move to the Fax line then type in

0277 211350

As you will see, the cursor is now at the end of the fax telephone number. There is no Mobile telephone number so press  twice to move to the Memo line and then type:

Designer/manufacturer of NC200

You have now entered your first name and address in the address book section. Press the  key twice which will return you to the main screen of the Diary/Clock/Address Book section.





STEP 24:



Now press the Red key again.

As you will see from the screen display below, on the right-hand side there is a list of questions.

Diary/Clock/Address Book	
Name	Restrad plc
Address	159 Kings Road Brentwood Essex CM14 4EF
Home Tel	
Office Tel	0891 808181
Fax	0277 211350
Mobile Tel	
Memo	Designer/manufacturer of NC200

(A) Add New Address
(E) Edit Address
(I) Find Address
(D) Delete Address
(P) Print Addresses
← Browse →
press Stop to exit

Across the question **Browse** you will see a dark band. By using the   keys you can move this dark band up and down. By using the White  key, move the dark band to the top item **(A)dd new address** and press the  key.

As you will see, you will turn to the next blank page in your address book. In order to explain to you the full features of the Address Book we will need to type in four more names and addresses. When typing, remember all the keys which you used in the word processor section such as , SHIFT, Spacebar, , have the same function in the address book. So if you make mistakes or need upper or lower case, use the keys as you would in the word processor section.

STEP 25:

Now type in the following (*COPY THEM EXACTLY*). Remember, when you are at the end of a line, to press the  key.



John Smith
1000 High Street
Braintree
Essex CM7 8QN

0222 215555

0222 215556

0850 555123

Accountant

The cursor is now at the end of the memo information. Press the  key and you will see that once you have filled up a full page of the Address Book by pressing the  key you will move on to the next page.

Now type in:

Brian Layer
The Essex Brick Co Ltd
Old Kiln Works
Chelmsford
Essex CM0 7DY
0245 442277
0245 123456
0245 789000
0863 485961


In this case there is nothing to enter for memo so just press the  key to bring you to the top of a new page.

Now type in:

Doctor Jones
The Medical Centre
High Street
Southend on Sea
Essex SS3 9QY
0702 133444 (Only call in Emergency)
0702 987654

0702 123456

If not available ask for Doctor Brown

As the cursor is now at the end of the page press the  key which will once again take you to the top of the next page. Now type in:

Star Garage
Chiltern Works
Green Street
Basildon
Essex SS15 6DU

0268 515151

0268 121212

0836 474747

Ask for PETER BROWN

The cursor is now at the end of the memo field. Press  to exit.

We have now entered a total of five names and addresses. As you will see from the screen below, the last entry is showing on the screen.

Address Book		London	Thur	Man	Essex	West	Isle
Name	Star Garage						
Address	Chiltern Works						
	Green Street						
	Basildon						
	Essex SS15 6DU						
Home Tel	0268 515151						
Office Tel	0268 121212						
Fax	0268 121212						
Mobile Tel	0836 474747						
Memo	Ask for Peter Brown						

(A) Add New Address
(E) Edit Address
(F) Find Address
(D) Delete Address
(P) Print Addresses
(C) Browse (C)
press Stop to exit

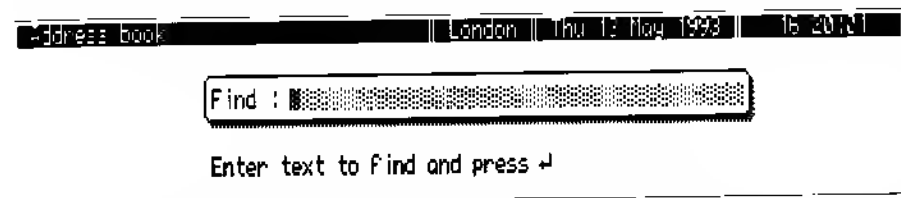
You will also notice that the dark band on the right-hand side is over the word **Browse**. By using the Red or Green keys you can browse through the list of names and addresses you have in the Address Book.

Press the Red key now and you will see it will take you to one of the other names in the Address Book. Press it again and again and it will take you through all the addresses that we have put in the Address Book.

Pressing the Green key will do exactly the same but in the reverse order. Notice that the names appear in alphabetic order.

As you can see from the right of the screen, there are six different facilities in the Address Book section. One of the most interesting is the facility **(F)ind Address**. To get into the **(F)ind Address** section use the White **[↑]** key by moving the dark band on to **(F)ind Address** and press the **[↵]** key.

As you will see from the screen below, you are invited to type in the address or the name that you wish to find.



This is an excellent facility. As you know, when you are thinking about somebody or some company there are certain things that you remember them by. You cannot for example, remember their address. You cannot remember in some cases their full name. You cannot remember in some cases their telephone number. The screen above allows you to type in whatever you can remember about the Address Book entry you are trying to find.

Let us for example say that we are trying to find the address book entry of the local garage. All we can remember is that the garage is in **Chiltern Works**. Type in **Chiltern Works** and then press the **[↵]** key. As you will see the Notebook will immediately take you to the address book entry of the Star Garage.

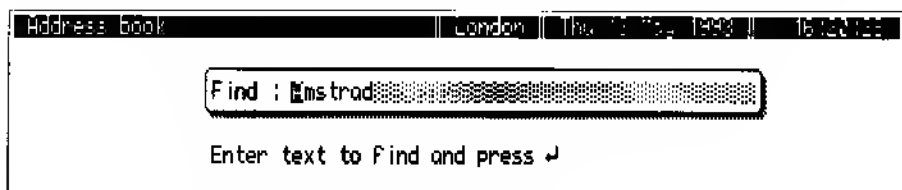
Now let us try another example. Let us say we wish to find the telephone number of Amstrad but we can only remember the name **Amstrad**. Once again move the dark band over **(F)ind Address** and press the **[↵]** key. You will see the name **Chiltern Works** is still on the screen. Ignore this and simply type in **Amstrad**. You will see now that the old message **Chiltern Works** has gone and **Amstrad** is now on the screen.

Once again press the **[↵]** key and you will see the Notebook will take you immediately to the Address Book page for Amstrad.

You will notice on the right-hand side of the screen where the six messages are that five of the messages start with a Bold Capital letter **A E F D P**. Instead of using the White **[↑]** key to move the

dark band on to the message, there is a quicker method to use and that is simply to type in the **Bold Capital Letter**.

As an example, let us try to find the **Doctor's** telephone number. Simply press the F key. As you will see, the Notebook moves to the screen with **Amstrad** still showing from our last exercise.



Now type in **Doctor** and press the **↵** key. You will see the Doctor's name and address appear on the screen.

If any of the details in your Address Book entries change, you may wish to edit them. For example, the Doctor may change his telephone number.

As you have the Doctor's name and address on the screen, let us imagine that he has changed his home telephone number and you wish to replace it in your address book.

As you will see, on the right-hand side of the screen, to edit the address book simply press the **E** key. After pressing the E key, you will notice that the cursor is at the end of the first line. By using the **Blue** key, bring the cursor down to the line which you wish to change (*Home tel*). By using the **Red** key, bring the cursor along the line to the beginning of the line. The cursor is now at the beginning of the telephone number. By using the **←** key delete the telephone number until the cursor is positioned left of the words (*Only call in Emergency*).

Now type in the new telephone number **0702 354867** and press **Stop** to exit.

You will now see that you have deleted the old telephone number and entered a new one.

If, for example, you wish to delete a whole page of your Address Book, first of all find the page you wish to delete. Let us say we wish to delete The Essex Brick Co. Ltd. Press the **F** key and type in

Brick. As you will see, the name and address of The Essex Brick Co. Ltd. will appear.

Now press the **D** key on the keyboard and as you will see from the screen shown below, you will be asked if you wish to delete this address.

Address Book		Delete current address ? Press Y For Yes or N For No		Menu of Questions	
Name	Brian Lo			(A) Add New Address	
Address	The Essex			(E) Edit Address	
	Old Kiln			(F) Find Address	
	Chelmsford			(D) Delete Address	
Home Tel	Essex CH2 7DY			(P) Print Addresses	
Office Tel	0245 442277			(B) Browse (A)	
Fax	0245 123456			press Stop to exit	
Mobile Tel	0245 789000				
Memo	0863 485961				


If you do, you should press the **Y** key on the keyboard and if you have had second thoughts and do not wish to delete it, press the **N** key on the keyboard.

In this case we have decided to delete The Essex Brick Co. Ltd., so press the **Y** key. Now by using the **Browse** function (Red and Green keys) you will see that The Essex Brick Co. Ltd. is now longer in your address book.

If you have any problems, see page 460 for details of our telephone support

We now suggest that you type in a few of your most important names and address and explore the full use of the questions on the right-hand side of the screen (Menu of Questions). You can, of course, delete the examples that we have typed in when you are practising in this area. One tip to remember is the most useful function of this section is that you can simply type in any name, word, town, village, building name, phone number, memo entry or even a post code to find the Address Book page you are looking for.

So, if all you can remember about John Smith is that he lives in Braintree, type in **Braintree**. Or if all you can remember about the Doctor is the fact that he is a Doctor, type in **Doctor**. If you have entered your aunty's details into your address book and you wish to send her a birthday card and cannot remember her address but can remember her phone number, simply follow the procedure by typing in her phone number and her full details will appear.

When you have finished using this section of the Notebook, press  twice to exit to the main screen.

STEP 26:

To Print Out a Full List of Names and Addresses

While using the address book, if you wish to print out your list of names and addresses, plug in your printer in the normal way and by using the white arrow key, move the dark cursor over the words **(P)rint Addresses** and press the enter key. (Alternatively just press P to quickly select this option). Please ensure that you have adequate paper in your printer.

Note that you can also save a copy of your address book on a floppy disk. Instructions for how to do this are given in Section 2.

If you leave the Notebook switched on without using the keyboard for more than five minutes, it will automatically switch off. Simply press the power key and the screen will return.

STEP 27:

Using the Calendar/Diary Section

Press the Yellow and Blue keys. As you will see the screen is in three sections. We have already explored the Address Book section and now we are ready to explore the Calendar/Diary section. Do as the screen says and press the Green key.






The screen diagram below will display on the left side your location, date and actual time, in the middle there will be the actual month. On the right-hand side you will see a cluster of four arrows.



May 1993						
Mon	Tue	Wed	Thu	Fri	Sat	Sun
15	14	13	6	1	1	2
22	21	20	23	22	21	20
29	28	27	26	25	24	23

To make a diary entry select date using the   keys and press . Press P to print.


1992
April + June
1994

The four arrows have a very simple purpose. The arrow pointing to the left means the Red  key. By pressing it continually the cursor will reach the left-hand line and automatically change the month to last month. (You must watch the screen while you are pressing keys.) If you continue to press the Red  key the month will continually change downwards. By pressing the Green  key the cursor reaches the right-hand line and the months will start to increase. By pressing the Blue  key, when the cursor reaches the bottom of the screen the year will change upwards. And finally, by pressing the White  key, when the cursor reaches the top the year will change downwards.

We suggest that you experiment by moving the cursor around with the arrow keys and watch the changes on the screen carefully. Do this for a few minutes and then return back to the actual month and year. This facility obviously enables you to look forwards or backwards to any date in the past or in the future.

STEP 28

Making a Diary Entry

To make a diary entry locate the correct month and year by using the arrows as described above. Once you have the correct month and year use the arrow key again to move the cursor to the correct day in the month that you require. Once the cursor is over the correct day in the month that you require, press the  key. As you will see from the diagram below, you are invited to type in your diary entry.



Editing diary entry For 12 August 1993. Press Stop to Finish. 16/08/90
Start typing new text here


Let us for example type in the following:


Remember to take car in to garage


Now press the  key.

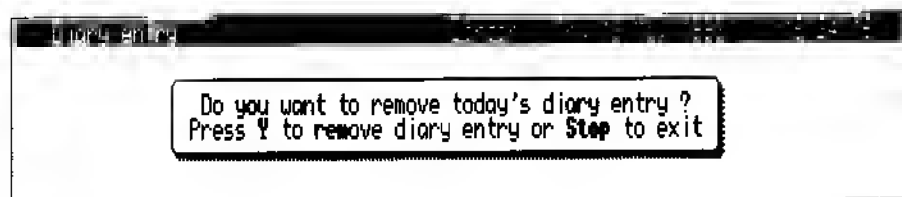
You will notice that when the screen returns the cursor is in the same place over the day that you chose, but there is now a star * by the date that you chose. Using the arrow keys again, move the cursor around within the same month to another date further on in

the month and press the  key. Type in another example message and finish by using the  key.

You will now see that the two dates in the month are both marked with a star. The reason for this is that when you are browsing through the various months, any date which has a star by the side of it means there is a message in the diary. If you wish to look up any date in the month which has a star by it, simply move the cursor over the date which has a star by using the arrow keys and once the cursor is in place press the  key and you will see your diary entry appear.


One very good feature of the diary section is that once you have put a diary entry in for a certain date, when you switch the Notebook on for the first time that day the bottom right box on the screen will flash a message on and off and the Notebook will make a bleeping sound reminding you that there is a diary entry. Simply press the  key and your diary entry will appear.

Once you have read the diary entry press the  key. As you will see from the screen diagram below, you are asked if you wish to remove the diary entry or not. Simply follow the instructions. If you wish to remove the diary entry (probably a good idea) press Y.



STEP 29:

Removing future diary dates

If you have made diary dates for the future which for some reason have to be cancelled and therefore you wish to delete the diary message, simply locate the month and year, move the cursor on to the actual day which has the star and press the  key. Once again you will be asked to press the Y key if you wish to delete the diary entry.

Press the  key twice to exit to the main screen.

STEP 30:

Printing out Diary Notes

If you have stored many diary notes and you wish to print them out you can choose to do so on a Weekly, Monthly, or indeed All basis. Plug in your printer in the normal way. Whilst on the diary screen press the letter P on the keyboard and follow the instructions, which will allow you to either show your notes on the screen first of all or allow you to print them out. In either case you will be offered the choice of printing diary entries for the next week, for the next month, or every entry you have in your diary.

Note that it is also possible to copy your diary entries to a floppy disk to keep a back up copy. Instructions how to do this are given in Section 2.

STEP 31:

To use the Time Manager/Alarm/Clock Section.

Starting at the main screen press the Yellow and Blue keys.

As you will see from the next screen we have already explored the Address Book section and the Calendar/Diary section. To enter the Time Manager section, press the Blue key.

As you will see from the diagram below, the Time Manager screen is divided into 4 sections. You've already seen how to use the option **To set the Time and date** on page 3.



To set an Alarm

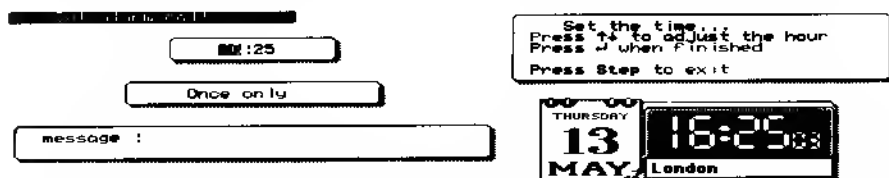
You will see from the screen that the middle section states **No Alarms Set**. This means that there is no Alarm call set in the Notebook memory.

The purpose of the Alarm section is two fold. You can use the Alarm just as you do with any Alarm Clock to wake you up in the morning or to remind you of an event during the day.

STEP 32:

To set an Alarm call follow the instructions shown on the left hand section and press the Red key.

As you will see from the screen below, the current time is displayed on the left side.



To demonstrate how an Alarm call works, we will set the Alarm for two minutes ahead. You can imagine it is being set for any time ahead.

The cursor is now over the hour digits. As we don't wish to set the hour for this experiment simply press the key. The cursor is now over the minutes digits - press the White key until the minutes are 2 minutes ahead of the current time shown on the top line, right corner of the screen. Now press the key and by using the power switch, switch off the Notebook and wait.




After a while you will see and hear the Notebook jump back into life. The screen will come on and the Alarm will sound.







As the screen says, press to Exit.

The exercise we just performed was to set an Alarm call only two minutes ahead of the current time.

Now try again and set an Alarm for 07.00 am tomorrow morning. Assuming the time today is after 07.00 am, press the Yellow and Blue keys, then press the Blue key followed by the Red key.

As you will see the cursor is again over the hour digits. By using the   keys, set the hour to 07 and press the  key.


The cursor is now over the minute digits, by using the   keys adjust the minutes to 00 and press the  key.


The alarm has now been set for 07.00 am which means if you switch the Notebook off now, it will sound the Alarm and switch on at 07.00 am tomorrow. Now press the  key.

STEP 33:

Using the Alarm Function as a reminder

One of the other useful functions of the Alarm section is the facility to put a message into the Notebook at the same time as an Alarm call. For instance, let us say you wish to be reminded today to telephone someone at a specific time.

Follow this example: Press the Red key to bring you the set alarm screen. For the purpose of this example leave the hour as current and press the  key.


Now set the minutes three minutes ahead of the current time (as shown on the top line right corner of the screen) and press the  key.

As you will see on the right side of the screen, there are a list of functions. Now press the letter M on the keyboard.

You will now see a shaded area appear in the bottom left hand corner of the screen with the cursor on the far left.

Type in:

Remember to call John at the office.

Now press the  key and turn off the Notebook with the power key and wait.

After a while the Notebook will switch on and the message will show on the screen as well as the Alarm sounding.

Alarm call

16:29 Remember to call John at the office.
Press Stop to exit



Press  to exit to the main screen.

Finally, if we don't show you now how to delete or cancel an Alarm call you will be woken up at 7.00 am tomorrow!


STEP 34:

To cancel an Alarm Call

Press the Yellow and Blue keys, then press the Blue key only. You will see the middle message on the screen **Edit existing alarm calls**. Press the Green key. As you see from the screen below

Press J to edit.
Press Del to delete.
Press Stop to exit



The Alarm call you have set is stored in the Notebook. By following the instructions on the bottom line of the screen press the  key.

Edit alarm call

Press Y to delete alarm call
or press Stop to exit

Press J to edit.
Press Del to delete.
Press Stop to exit



The screen will now invite you to confirm the cancellation. Press the Y key on the keyboard, and you will see the Alarm and message disappear and you can sleep easy tomorrow as you have just cancelled your 7.00 am alarm call.

There are many other functions in the Alarm section which are dealt with in more detail in the second section of this book.

STEP 35:

Changing Time Zones when you travel to other countries.

We hope you will take your Notebook with you on all trips.

To change the time to other time zones, press the Yellow and Blue keys then press the Blue key and press the Blue key once again. The screen below will show you the present time zones.

Time Zone	difference	Time
Central Europe	+01:00	16:30
Moscow	+03:00	19:30
Bombay	+05:30	21:30
New York	-05:00	08:30
Los Angeles	-08:00	05:30
Tokyo	+09:00	01:30
Sydney	+10:00	02:30

Press E to edit zone and offset
Press ↓ to select as current time zone
Press ↑ arrow keys to move
Press Stop to exit



Let us say you are travelling from England to an European destination.

For most of the year Europe is one hour ahead of the UK. You will see from the screen that dark band is over the word London. Press the Blue (↓) key and you will see it move down over Central Europe, watch the bottom right corner of the screen and press the Blue key. You will see the time jump ahead by one hour and the location name change from London to Central Europe.

Now let's get more adventurous and imagine we are in Japan which is normally nine hours ahead of the UK.

Press the Blue (↓) key again to bring the dark band over Tokyo, look at the bottom right corner of the screen and press the (↵) key and once again the time and location have changed.

To go back to London time, press the White (↑) key to bring the dark band over the word London and press the (↵) key. As you see the clock box shows London again as your location and the time is back to normal.

In the second section of the book we will explain how to put in other locations and their time differences.

Hold down **[Function]** then press the **[Stop]** key to return to the main screen.

STEP 36:

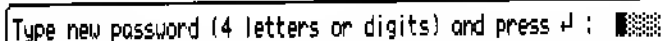
Do you want to know a secret?

Using the secret function

As you will notice, there is a key marked 'Secret' on the keyboard (*Next to the Red key*). The purpose of the secret function of the Notebook is to allow you to store information in the Notebook's memory which is your confidential and private data.

To operate the secret function, simply hold down the Yellow key and then press the **[Secret]** key at the same time.

As you will see from the screen display below, you are invited to type in a password or a PIN number (*Personal Identification Number*).

The image shows a rectangular screen display with a black border. Inside, the text "Type new password (4 letters or digits) and press ↵ : " is displayed in a monospaced font. To the right of the text is a small icon consisting of a grid of dots.



Now type in a number (*4 DIGITS*) which you will remember and press the **[↵]** key.



As you will see, you are invited to double check the number, so type it in again and press the **[↵]** key.

Once you have double checked your Password/PIN and pressed the **[↵]** key, you will see the screen now invites you to type in your data. Type in the following:

This is my secret memory store

Now press the **[Stop]** key.


Just as an experiment, press the Yellow key and Secret key again, type in a wrong Password/PIN deliberately and press the  key. You will see that you are unable to get into your secret information. Press  to exit.

Now press the Yellow and Secret keys again and type in your correct Password/PIN followed by the  and you will see the message appear again. Press  to exit.

If you forget your password/PIN refer to page 84.

STEP 37:

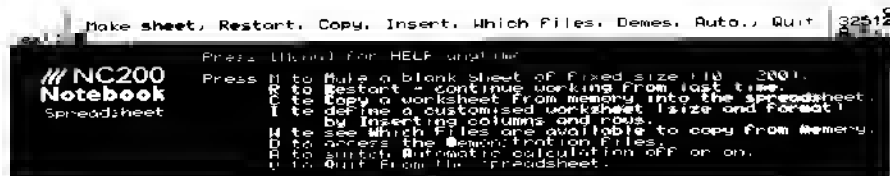
The Notebook Spreadsheet

From the Main screen, if you hold down the Yellow key and press the White  key you will see the following choices:



These options are similar to those you saw when using the word processor but, instead of selecting word processing documents, the screen refers to Worksheets. This is the name given to the grid of numbers and formulae that you work on in the Notebook's Spreadsheet program.

If you press the Red key you can start a new worksheet. You will then see the opening menu of the spreadsheet:



As indicated on screen, you can press the **Help** key to get help. When you are using the spreadsheet the **Help** key can always be pressed to get help on the command that you are currently using.

Also, at any time, the line above the command entry line will always show you what the currently valid options are for you to use. To select an option you only need to press the first (capital) letter of the option you wish to use. This should make learning to use the spreadsheet as simple as possible. However, it must be said that the spreadsheet is a very powerful tool but this means it is a somewhat complicated piece of software for the novice to understand.

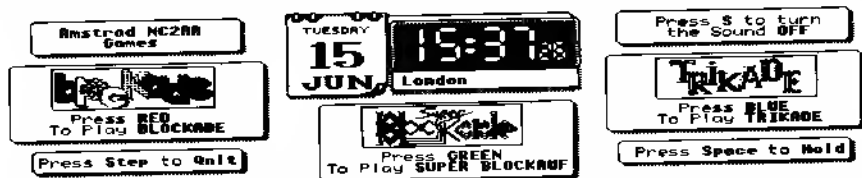
No more guidance on use of the spreadsheet will be given here. Those who wish to use it more should refer to Section 2 where its operation is covered in detail with a comprehensive tutorial guide.

As with most other parts of the Notebook's software, the **Stop** key will always get you out of an option you did not really wish to use. If you press **Stop** at the opening menu of the spreadsheet you will return to the previous Notebook menu. Press **Stop** again to return to the Notebook's main screen.

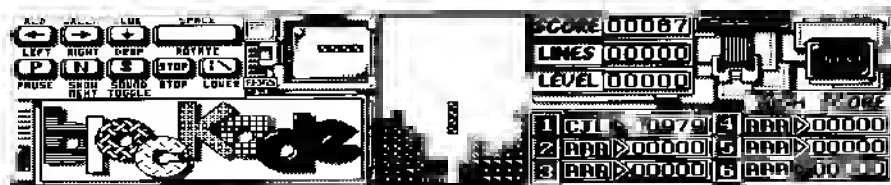
STEP 38:

Playing the Blockade and Trikade Games

Included in the NC200 are three games. These can be accessed simply by holding the Yellow key and the G key on the keyboard.



To choose from the three games simply use the Red, Green or Blue keys. Once you are into the game you will see on the screen which keys are needed to play the game.



If you wish to switch off the sound, press the S key and if you wish for the sound to return, press the S key again. Pressing the P key will pause the game. Press any other key to continue.

Normally the next shape is shown on screen. Press the N key to stop this. More points are available when the Next Shape display is turned off because it makes the game a little trickier to play.

To move the falling pieces use the and keys to move left and right. Use to rotate a shape and use to drop it into place. The key will make the shape drop more quickly but it will fall at the slower speed again if you release the key.

In all three games the idea is to slot the falling shapes into place to try and completely fill horizontal lines. Notice that shapes can be slid sideways into place.

Points are scored when you drop a piece using the key. Each time you complete a line you get a large score. If you can arrange to complete more than one line at a time there are even more points available. In TriKade you also get a small score each time two triangles merge.

In Super Blockade there are some particularly awkward shapes. To help you deal with the problems these cause there are special shapes, coloured black, which will remove previously laid shapes.

In TriKade there are both triangles and squares which you must try and fit together. Similarly coloured triangles always fit together.

The bombs that appear in TriKade can be used to remove previously laid shapes. Note, however, that you lose some of your score when a piece is removed.

In all three games the speed increases as the level goes up. You go up a level when a certain number of shapes have been placed. In Super Blockade and TriKade the complexity of the shapes increases on later levels.

All three games end when there is no more room for a piece to drop or if you press the **Stop** key. The screen will show the message GAME OVER. If your score is one of the best six for that particular game you will be able to enter your initials into the high score table.

The entry will start off showing "AAA" and the first "A" will be flashing. Use the **↑** and **↓** keys to change the letter, then press the **Carriage Return** key to move on to the next position. Pressing the **Enter** key will accept the entry.

The high score tables for the three games will always be stored in your Notebook so each time you play you can try to beat your previous best score.

STEP 39:

Other features of the Notebook

In addition to the features that are available from the Notebook's menus, that have been described in the preceding steps, there are two more features in the Notebook that should be mentioned here. They are described in detail in Section 2.

If you hold down the Yellow key and press B you will switch to the BASIC programming language interpreter.

```
BBC BASIC (NC200) Version 3.12
(C) Copyright R.T.Russell 1993
>
```

This is a version based on BBC BASIC that is used in most schools and allows you to program the Notebook. A short tutorial and list of commands recognised can be found in the second section of this manual. To leave BASIC you cannot just press **Stop**. You must type the command *QUIT to leave BASIC or hold down the Yellow key and press one of the other coloured keys to switch to another part of the Notebook's software.

If you hold down the Yellow key and press S you will switch to the Notebook's Serial terminal program which can be used for connecting to other computers and sending/receiving your documents.

NC200
Notebook
Serial Terminal Program

Press **MENU** For Terminal Options
Press **↵** to start the terminal now

When you are using the terminal you initially just see a blank screen - this is normal. If you wish to leave the terminal you can either press **[STOP]** to return to the Notebook's main screen or press **[PAGE UP]** to access the terminal's main menu from where you can press **Q** to Quit.

Conclusion

This is the end of **Section 1** of the book. We hope that it is simple enough for you to have understood the basic functions of your Notebook. Section 2 covers the operation of the Notebook in far more detail.

Once again, may we remind you to fill out your Warranty Card and return it to us immediately so that we can keep you fully informed about all matters relating to your Notebook.

SECTION 2

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Powering the Notebook

We would recommend that where possible you should use the mains adaptor to power your Notebook. However, when you are on the move, the Notebook is powered by 5 C cell batteries. These will enable you to work for approximately 35 to 40 hours (depending on how much the back light and floppy disk are used). When the batteries need to be replaced a warning message is flashed on screen telling you to replace the batteries.

Main batteries are low. Please switch off and replace battery ...

Use five alkaline type C, 1.5V cells. It is possible to fit rechargeable (NiCad) batteries but, at best, these will only provide about 10 hours of working time before needing to be re-charged. NiCad batteries will not be recharged inside the Notebook when the mains adaptor is being used. They must be recharged in an external charger.

As explained in Section 1, when you use the back light, power consumption is increased to three times normal level. When you use the floppy disk drive power is increased to about twelve times normal level. Therefore, it is best to try and limit your use of these things while operating from batteries.

When there is no other source of power (when replacing the C cell batteries for example) the lithium battery will maintain your work in the Notebook memory (the estimated life of the lithium battery is 5 years). If the lithium battery needs replacing you will see the message "**Lithium battery is low...**". Ensure that good alkaline batteries are fitted or the mains adaptor connected while you replace the lithium battery. You must use a CR2032 type battery which can be purchased at many electrical or photographic shops.

Warning: If all power sources are disconnected all the stored information; documents, addresses, diary entries etc will be permanently lost from the Notebook memory. If you regularly copy your work to floppy disks you can always recover it if this should happen.

WARNING

Your Notebook contains a Lithium battery. Danger of explosion if recharging is attempted. Replace the Lithium battery with the type CR2032 battery as recommended by Amstrad plc. Do not dispose of the old Lithium battery in the fire.

Switching off

You can switch off your Notebook at any time while you are using it and the work you are doing will be stored (except in BASIC).


When you switch on again you will be returned to the Main Screen. You may see the following message on screen for a few moments:

Storing

This will sometimes occur when you switch off while there is a word processor document on the screen.

Automatic Power off

If you leave your Notebook switched on but don't touch any of the keys for five minutes it will automatically switch itself off to conserve power.

The five minute period can be changed using the Systems Setting menu (press  key at the Main screen) but be careful, if you set the power off delay to zero, automatic power off will not occur and your batteries will be drained if the Notebook is left switched on.

Switching on

When you switch on the Notebook you will be returned to the main screen unless the Notebook automatically powered off the last time you used it, then you will be returned to whatever you were doing at the time, this is called "Preserving the context".



If you would prefer that your Notebook always preserved the context when you switch on change the **Preserve context during power off** setting in the System Settings menu (see below).



When programming in BASIC it is a particularly good idea to have the Notebook preserve context at switch off. BASIC programs that you enter are only saved when you explicitly give the command to do so. If you inadvertently switch off you can lose many hours of work if you have not recently saved what you were doing.




Backlighting the LCD

When you first switch the Notebook on the screen will be back lit. If you don't touch a key for one minute the back light will be switched off to conserve power. As soon as you press a key the back light will come on again. This is known as "automatic" operation of the backlight.




Because of the extra power consumed by the back light you should always switch it off when it is not needed.



If you are using the machine in well lit conditions you can switch the back light off by holding down  and pressing the  key. Press the same keys again to switch it back on.



If you would prefer that each time you switch the Notebook on the backlight never comes on unless you press   or that it comes on and stays on all the time, you can change the normal operation in the System Settings menu.

Make sure you are at the Main screen of the Notebook (press   to get there from any part of the Notebook software). Now press the  key.

The setting **Screen back light** will currently be set to **Auto** so that the backlight comes on at switch on but goes off after one minute of keyboard inactivity.

Use the  key to move down to the option. Using the  and  keys you will find that the option can also be set to **Off** or **On**.

When set to "Off" the backlight will never come on when you first turn the Notebook on. You must press   if you want to switch it on.

When set to "On" the backlight will always come on when you switch the Notebook on and it will never go off unless you press the   keys together. (Obviously it does go off when the

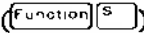
machine switches off completely after the delay set in the "Power off delay" entry of the System Settings menu)

Using the floppy disk drive from batteries

Although the floppy disk drive consumes a large amount of power, in reality, it is never really used for very long. Copying several documents will never take more than a minute or two. It is quite possible to use it while operating from batteries. However, you may see a warning message that tells you that the disk drive cannot be used because the batteries do not have sufficient power. The Notebook itself will still operate for many hours after this but you must either fit new C cells or operate from the mains adaptor in order to use the disk system.

When you format floppy disks the drive is used quite intensively. Therefore, it is a good idea to format several floppies at one time while operating from the mains adaptor at home or in the office. Alternatively, if you have access to one, you can use a PC compatible computer to format the disks for use in the Notebook (remember that they must be 720K though).

Battery usage in the Serial Terminal program

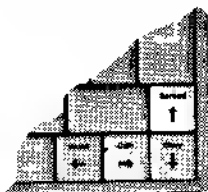
When you are using the serial terminal program () the RS232 port is switched on. This increases power consumption. It is therefore advisable to try and use the mains adaptor when operating the terminal program if possible.

Also, do not leave the Notebook in the terminal when it is not actually being used as this will cause a needless waste of battery power.


Getting Around



From the main screen you can access all parts of the Notebook program by holding down the YELLOW key then press the RED, GREEN, BLUE or WHITE key (the messages on screen tell you which key to press).

The     Keys






When using your Notebook you will find that sometimes the coloured keys are referred to on the screen by their colour and at other times by the arrow symbols printed on them.

The  key


Press  at any time to finish what you are doing, and return to the previous screen. You may have to press  several times to return you to the main menu.

Advice for beginners

When you first use your Notebook you may find you "get lost" especially when using the more complicated word processor features and pressing  will enable you to escape. As you become familiar with your Notebook you will use the  key less as you learn the short cuts.

If you ever get really lost you could switch off and on again to return the familiar Main screen. Alternatively, hold down the Yellow key and press  - this is always a quick way back to the main screen.

Short Cuts

You can short-cut the menus on your Notebook and go directly to the part you want using special key combinations to avoid having to return to the main menu. For all the short cuts hold down the YELLOW  key and press another key.





Function	Word ←	- To the word processor or returns you to the document you are typing.
Function	Spread ↑	- Switch to the Spreadsheet menu
Function	New ↖	- Start a New Document
Function	List ↓	- To the List of Stored Documents
Function	Print x	- To Print a Document
Function	Calc →	- To use the Calculator
Function	Diary ↓	- To the Diary Menu
Function	Address □	- To the Address Book*
Function	Calendar □	- To the Calendar/Diary
Function	Time □	- To the Time Manager
Function	Alarm □	- To the Set Alarm Call Menu
Function	Time Zones □	- To Time Zones Manager
Function	Stop □	- To the Notebook opening screen
Function	Games □	- To the built in Games
Function	Memory x	- Run Memory Card Program
Function	Serial □	- Serial Terminal Program
Function	Run □	- Run a program from disk
Function	BASIC □	- To the BASIC interpreter
Function	Secret password	- Enter password for Secret Information

You can use the key combinations above to quickly move from one part of the program to another without returning to the main menu, for example while typing a document in the word processor, hold YELLOW and press GREEN to use the calculator, to return to the document hold YELLOW and press RED.






*Use this to insert an address from your address book into the document you are typing.

Single Key Operation

To assist the disabled the Notebook has been designed so that it can be operated using only one key at a time using the "Sticky shift" feature. Sticky shift has to be switched on at the System Settings Menu.

The way sticky shift works is that instead of having to hold down the    or  key while pressing another, the keys can be pressed one after the other.

At the main screen menu sticky shift will always work, for it to work at other times you must switch it on at the System Settings Menu:

- 1 Press  at the main screen
- 2 Press the  until you reach **Sticky shift keys**.
- 3 Press the  or  key until **Yes** shows on the screen.
- 4 Press .

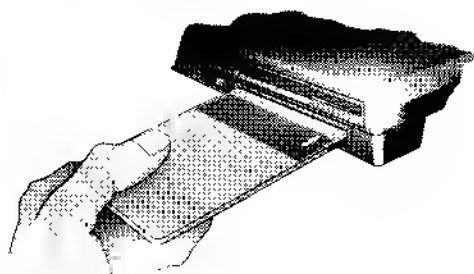
Memory

There are about 110,000 bytes of memory available on the Notebook for your "data", that includes all the information you type in; documents, worksheets, addresses, diary entries and alarms. See the Troubleshooting section for a full description of how the memory is used.

When you start to run out of memory your Notebook will give you a warning, to make space in the memory you will have to copy some of your older documents from memory to floppy disk and then delete them from memory to make space, refer to the Word Processing section below for instructions on how to do this.

Expanding the Memory

Although you can always use floppy disks to save your older data and make space in the internal memory of the Notebook, you can increase the Notebook's memory by the use of industry standard Static RAM (SRAM) cards (JEIDA/PCMCIA cards) that can be inserted into the MEMORY CARD slot of the Notebook. You may find it particularly useful to have a memory card if you make heavy use of the spreadsheet - especially its graphic functions.



Memory Cards with up to 1 MB capacity can be used with your Notebook. Instructions for looking after the cards, fitting the battery, write protection etc are supplied with the card.

Just like floppy disks, the card must be "formatted" before you can use it. Insert the card into the slot then select the List Stored Documents screen (hold down **[Function]** and press **[F3]**) then press **[F5]**. Select **F >> Formatting and export functions...** and press **[Enter]**. In the menu that then appears just press **[Enter]** to select the **M - Format Memory card** option.


With the memory card loaded documents, worksheets and addresses are automatically stored on the card. Documents and addresses that are already stored in the Notebook memory can be transferred to the card (see the instructions in the Address Book chapter and the Word Processing Guide).

Note that you should always switch the Notebook OFF before inserting or removing a memory card.

Word Processor - Introduction

The Word Processor is designed to be simple to use but has many advanced and powerful features. With very little instruction a beginner can type a document without needing to understand any of the advanced features while the experienced user will find that many of the features available on their usual word processor are also available on the Notebook.

If you are a beginner at using a computer or word processor read the first section of this book that gives simple step by step instructions to get you started. Remember that you cannot harm your Notebook by pressing the wrong keys, so don't be afraid of trying things out (if, while doing this, things happen that you don't


understand press the  key until you return to the main screen or a screen you do understand).

For detailed information and instructions on word processing read the front section of this book and the Word Processing Guide later in this book.

Features of the word processor

Features that are available include; Spell checking, mail merging, word count, cut and paste, find and replace, keyboard macros, accented characters, case changing and un-delete.

The Notebook date and time, and addresses from the Notebook address book can be directly inserted into a document.

Press the  key during word processing or use the key combinations listed on the Notebook "Template" (just beneath the LCD) to access all these features.

Transferring Documents to other computers

Documents and worksheets can be transferred to other computers using a lead connected to the serial port and using the in-built serial terminal program supplied with your Notebook. You may, however, find it much simpler to just copy them to an MS-DOS format floppy disk that can easily be read in any IBM PC compatible computer.

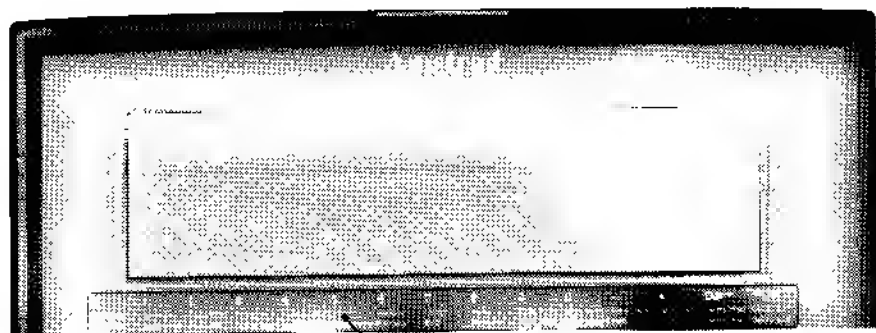
The word processor documents can be transferred in the "Protext" format for further editing within Protext on your PC or Amstrad PCW, or can be converted to either ASCII or WordStar format before transferring so they can be loaded into other programs.

The Notebook word processor is a special version of Protext by Arnor, if you would like to buy a copy of Protext for your desktop computer (IBM compatible PC, Amstrad PCW or others) it is available from computer dealers or direct from Arnor Ltd, 611 Lincoln Road, Peterborough PE1 3HA (telephone 0733 68909).

The spreadsheet in the Notebook is based on "The Cracker" which is available to run under CP/M on Amstrad PCW computers. There is also a version for IBM PC compatible computers. Both can read the .MEM files produced by the Notebook spreadsheet. The Notebook spreadsheet can also write out the numeric data (not formulae) of a worksheet as .DIF files (Data Interchange Format).

This is a common format that is readable by many PC based spreadsheet programs. The worksheet data can also be written out as .TXT (text) files for inclusion in word processing programs. The .DAT format writes the data in a format that can easily be processed by other computer programs.

The Template



The Template

Printed just below the screen of your Notebook is the quick reference template. Use it while word processing to remind you of some of the key combinations required. For the activities printed in yellow hold down the YELLOW **[Function]** key then press the key indicated (one of the keys along the top of the keyboard), for those in white hold down **[Control]** and press the key indicated.

Some of the operations take place as soon as you press the keys, and have an obvious effect, others you will need to learn how to use. For example, if you hold down **[Function]** and press **[F1]** all the words are counted and a message appears on the screen stating the total number of words in your document, but if you hold **[Function]** and press **[F2]** a "menu" appears on screen with various options. All these options are explained in the main word processor guide that follows.

Calculator

Hold down YELLOW **[Function]** and press GREEN **[Calc]**. For quick access to the calculator from another part of the program use the same key combination.

The calculator works in a similar way to most simple pocket calculators. The following table shows examples of each type of operation available.

Calculation	Example	Operation	Answer
Arithmetic	$15 \times 2 + 7 =$	15 (x) 2 (+) 7 (=)	37
	$(-32) \div 8 - 2 =$	32 (\pm) (\div) 8 (-) 2 (=)	-6
Constant	$30 + 25 =$	25 (+) (+) 30 (=) (25 constant)	55
	$25 + 90 =$	90 (=)	115
	$22 - 33 =$	33 (-) (-) 22 (=) (33 constant)	-11
	$95 - 33 =$	95 (=)	62
	$15 \times 4 =$	4 (x) (x) 15 (=) (4 constant)	60
	$45 \times 4 =$	45 (=)	180
	$45 \div 3 =$	3 (\div) (\div) 45 (=) (3 constant)	15
	$354 \div 3 =$	354 (=)	118
Percent	15% of 150	150 (x) 15 (%)	22.5
	13 as a % of 40	13 (\div) 40 (%)	32.5
Add-on	Increase 150 by 15%	150 (+) 15 (%) or, 150 (x) 15 (%) (+) (=)	172.5
Discount	Decrease 350 by 15%	350 (-) 15 (%) or 350 (x) 15 (%) (-) (=)	297.5
Square root	Square root of 45-29	45 (-) 29 (=) ($\sqrt{}$)	4


Calculation	Example	Operation	Answer
Summation using Memory	$32 \times 3 =$ $- (62 \div 2)$ $+ (53 + 22)$ $= \text{Total}$	(MRC) (MRC) (CE/C) 32 (x) 3 (M+) 62 (÷) 2 (M-) 53 (+) 22 (M+) (MRC)	96 31 75 140
Temporary memory	$(16 - (8 \times 3))$ $\times (27 - 13)$ $= \text{Total}$	(MRC) (MRC) (CE/C) 16 (M+) 8 (x) 3 (M-) 27 (-) 13 (x) (MRC) (=)	24 -112


Clear the calculator memory before performing a new calculation by pressing MRC twice then CE/C.

The small box at the top left labelled "Memory" will show you any value that is stored in memory. Press MRC twice to clear the memory.

If you press an operator key twice (++, --, ** or ÷÷) this invokes the constant feature. A small letter K appears in the display together with the operator you selected. Press CE/C to clear the constant function.

You will see a flashing **E** in the left of the display if an error occurs during a calculation or if calculation results in a number too large to be displayed. Press CE/C to clear this.

Unlike a normal calculator you can use  to delete wrongly entered numbers.

Press  to return to the main screen, or use one of the "Short-cut" methods to return to the screen you were using before the calculator.

Address Book

For step by step instructions read Section 1.

From the Main Screen hold down YELLOW **[Function]** and press BLUE **[i]**. To access the Address book from another part of the Program hold down YELLOW **[Function]** and press **[D]**.

If you have not used the address book before, and there are no addresses stored, you are taken directly to the screen where you can type in the first address:

Address book		London	How to How to	123456789
Name				
Address				
Home Tel				
Office Tel				
Fax				
Mobile Tel				
Memo				

Add/Edit address
Press **↑↓** to move
Press **Step** to exit

When you press **[↵]** at the bottom of the card the next blank card appears on the screen ready for you to enter the next address.

When you have finished entering addresses, press **[Step]**. The Address Book Menu is now displayed:

Address book		London	How to How to	123456789
Name	Astrod plc			
Address	165 Kings Road			
	Brentwood			
	Essex CM14 4EF			
Home Tel				
Office Tel	0991 808101			
Fax	0277 211350			
Mobile Tel				
Memo	Designer/manufacture of NC200			

(A)dd New Address
(E)dit Address
(F)ind Address
(D)elate Address
(P)rint Addresses
press **Step** to exit

To "Browse" through the addresses use the **[Word]** **[←]** **[→]** **[Calc]** keys. All the other options can be carried out either by pressing the initial letter of the option or selecting the option using **[Space]** **[↑]** **[Down]** **[↓]** then pressing **[↵]**.

(A)dd New Address: Select this when you want to add a new address to the address book.

(E)dit Address: Use to amend the address card showing on the screen - to amend one of the other cards, first use "browse" to find the card then press **[F]**.

(D)delete Address:

Delete the card on the screen - select the card you want to delete using "browse" then press [F7]. Confirm that you do want to delete the card by pressing [Yes] for Yes, or if you have changed your mind press Nitebook for No.

(F)ind Address:

Find a particular address card - If you have lots of addresses this will be quicker than using "Browse" to find the address you want. When you press [F7] you will be asked to enter the Name to Find, type in the name or any part of the address or telephone number and press [Enter]. If there is more than one occurrence of the text you have typed press [F8] then [Enter] until the address you want is displayed.

(P)rint Addresses

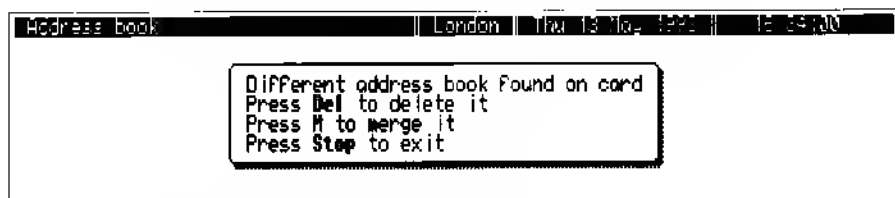
Allows you to print the complete contents of your address book to a printer. The addresses are printed starting on every ninth line so this can be used to print labels which are normally 9 lines high. If the telephone and fax numbers have been entered they are also printed.

Press [Stop] at the menu to go back to the Diary screen (press [Stop] again to go back to the main screen).

Storing the address book on a Memory Card

When a memory card is loaded the addresses you type will automatically be stored onto the card. If you already have addresses stored in the Notebook memory they will be transferred to the card when you access the address book.

The addresses are only stored on the card, so if you remove it from the Notebook your address book will be "blank". If you insert new addresses into this blank address book they can be "merged" into the address book on your card later. To merge the addresses, switch off your Notebook, insert the memory card and switch on again. Access the address book in the normal way (you will only be able to find the addresses stored in the Notebook memory) then press [Stop] you will see a message similar to the following:



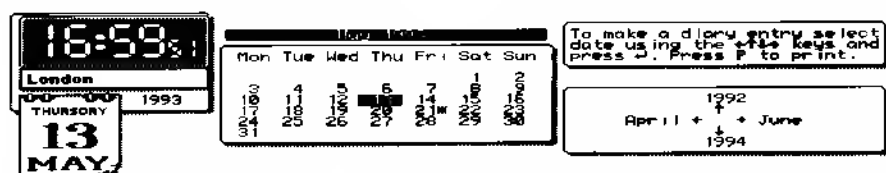
Press **M** to merge the addresses, if you press **Stop** the addresses will not be merged.

Note that it is also possible to keep a copy of your address book on disk (in fact, you can keep several different address books). This is explained in the later section about Using the Floppy Disk Drive.

Calendar and Diary

For step by step instructions read Section 1.

Hold down **YELLOW** **Function** and press **BLUE** **Down**, release the Yellow key then press **GREEN** **Right**.



Use the **Word** **Left** **Right** **Down** **Up** keys to move around the calendar as indicated on the right hand side of the screen. The months and years change only when you are against the edge of the calendar.

Pressing **Word** **Left** **Right** **Down** **Up** with **[]** will move a month or year at a time when the cursor is in the middle of the calendar.

The time and date are shown on this screen for your reference only, if you need to adjust the time or date go to System Settings (you should only need to do this if you set it incorrectly in the first place or when, if you are in the UK, the clocks change to British Summer Time).

To make a diary entry, position the cursor on the relevant date on the calendar and press **Enter**. Type the details of your appointments and relevant information into the diary editing screen:

Editing diary entry... Press **Stop** to finish. 11/00/92
 *start typing new text here

Using the diary is similar to typing a document in the word processor. When you have finished press **[Stop]**, the diary entry is indicated on the calendar with an asterisk (*).

Entries in your diary can be printed. From the calendar screen:

The screenshot shows a digital clock at 16:59, the location London, and the date Thursday 13 May 1993. A calendar grid for May 1993 is displayed, with the 13th highlighted. To the right, a text box explains: "To make a diary entry select date using the **↑↓** keys and press **⏏**. Press **P** to print."

Mon	Tue	Wed	Thu	Fri	Sat	Sun
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

Below the calendar, a box shows "April 1992" and "June 1994" with a double arrow between them.

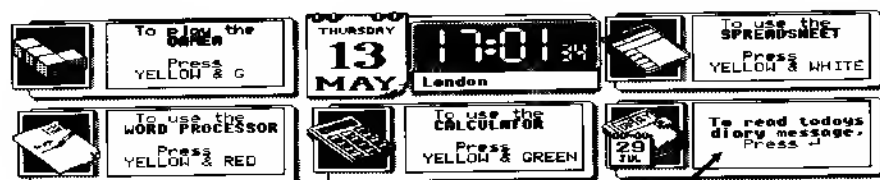
Press **[P]** to select the printing functions. You are now given the choice of whether you want to print them to the screen or to the printer. Press **[S]** for the screen and **[P]** for the printer. In either case you will then see the following:

Press **P** to print diary, **S** to show on screen;
 Press **W** for the next week, **M** for the next month or **A** for all;

Press **[W]** to print or show the entries for the next seven days. **[M]** will show/print those for the next month and **[A]** will show/print all entries in the diary.

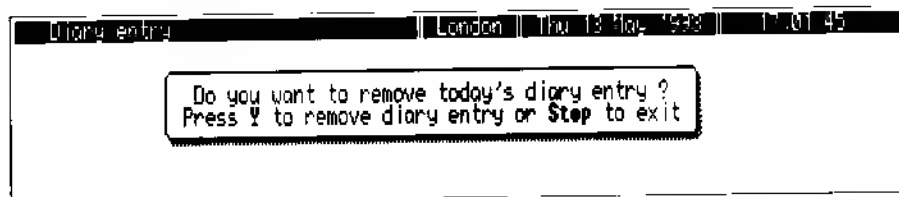
Diary Reminder

When you switch on the Notebook and there is a diary entry for the day, a message will show at the bottom right of the screen and a beep will sound to remind you to read your diary. This will continue every time you return to the main screen until you have read your diary by pressing **[J]** whilst at the main screen. You can disable this beep by setting the **Audible diary message warning** option to **No** in the System Settings menu.



Flashing message appears here

When you have read the diary entry press **[Stop]**, you have the option of deleting the entry if you wish:



Press **Y** to delete the message or **[Stop]** if you want to keep it. If you choose not to delete it, you will then be told about the message again each time you switch on that day.

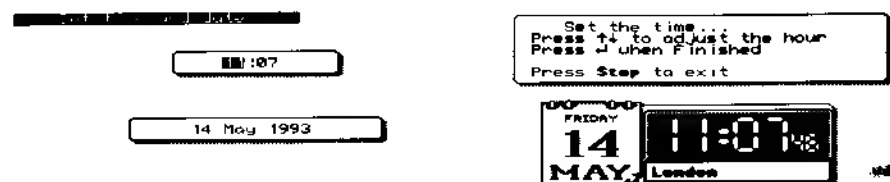
Note that it is possible to keep a copy of your diary entries on disk so that you have a backup copy in case anything ever happens to your Notebook. How this is done is explained in the later section about Using the Floppy Disk Drive.

Time Manager

Setting the date and time, international time zones and the Notebook alarms are accessed from the Time Manager screen. Press YELLOW and BLUE followed by just BLUE to get there.

Setting the time and date

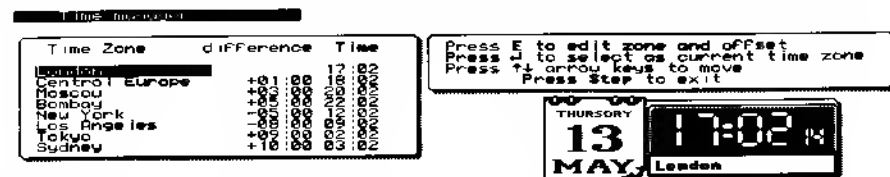
When you first started to use the Notebook you were asked to set the time and date. If you subsequently need to change it then press the WHITE key of the Time manager screen to access the date and time setting function:



Time Zones

For step by step instructions on using Time Zones read Section 1.

From the Time Manager screen press BLUE to access the Time Zones screen:



Your Notebook has been set up to show the time in London, Central Europe, Moscow, Bombay, New York, Los Angeles, Tokyo and Sydney, you can change these to any eight cities you require.

Select the City to change using the cursor keys then press $\left[\text{E} \right]$, type in your new city name and press $\left[\text{Enter} \right]$ then use the $\left[\text{Sp} \right]$ $\left[\text{Up} \right]$ cursor keys to change the time difference then press $\left[\text{Enter} \right]$.

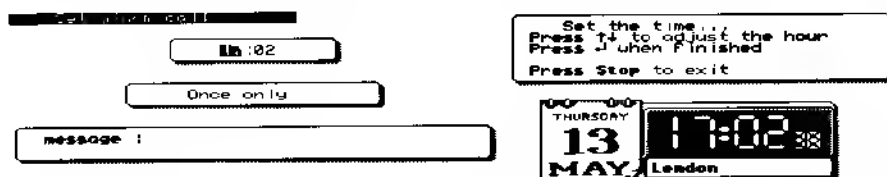
Current Time Zone

When you travel to a country that is in a different time zone select that zone as the "Current time zone". The other zones will adjust to give the time difference relative to where you are staying. Selecting the new current time zone will automatically adjust the time and place shown on the clock that appears on most Notebook screens, however, it will not change the times set for your alarm calls.






Alarm Calls




For step by step instructions on Alarm Calls read Section 1.

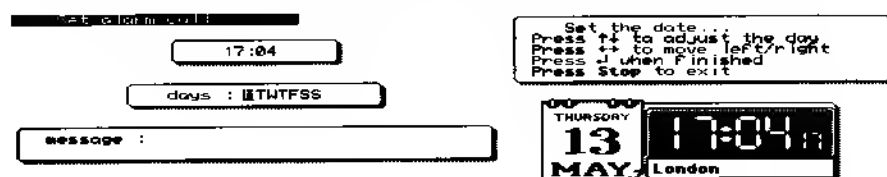
Hold down YELLOW  and press BLUE  then press  at the Time Manager screen. Press RED  to go to the "Set alarm call" screen:







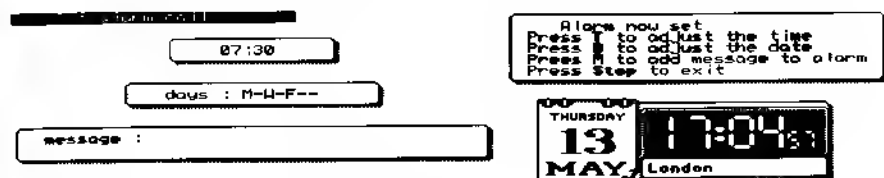
Follow the instruction on the left of the screen; you have to set the time first, then set the date and type in your message - note that messages are limited to 42 characters.

When you press  to edit the date it changes from **Once only** to **Repeats every day**. Press   to set a specific date, to return to "Repeats every day" use  or  until you reach the beginning or end of the month then press the key once more.



Advanced Feature: To set an alarm for the same time on several days of the week press  to adjust the date then hold down  and press  and you will see the following:







Each day of the week is represented by one letter, use the  or  to move the cursor from one day to the next then use the  or  key to cancel the days you do not want the alarm. So for example an alarm that you want on Monday, Wednesday and Friday might look like this:






Press  when you have finished.

To set an alarm call for 24 hours hence just press   at the Set Alarm screen.

To change the time, date or message of an alarm call

At the main screen hold down YELLOW  and press BLUE , press BLUE again at the "Diary menu" then press GREEN. The short cut method is to hold down YELLOW  and press  then press GREEN.

To get quickly to the "Set alarm call" screen from any other part of the program hold down YELLOW  and press .

Note that if you are editing a document / worksheet when an alarm goes off the message will not appear - you must press  to read the message.

Secret Information

For step by step instructions read Section 1.

For information that you might like to keep on your Notebook but do not wish others to access (for example; passport number, bank accounts and credit card details or private telephone numbers) we have provided a "Secret Information" screen which can only be accessed by typing a password that you have set up.

Set up your Password

Hold down **[Function]** and press **[Secret Menu]** you will see the following screen:

Type new password (4 letters or digits) and press **[Enter]** : 

Type in any combination of four letters and/or numbers and press **[Enter]**. You can use capital or lower case letters. The password is totally secure, so if you ever forget it you will not be able to access your information, you can only delete it so - **DON'T FORGET YOUR PASSWORD.**

You will be asked to confirm your password. Type exactly the same sequence again then press **[Enter]**.

Editing secret information. Press **[Enter]** to start typing new text here

You can now type in your "secret information", you can edit the text in the same way as you edit a word processor document (although you cannot print). Press **[Enter]** when you have finished. Next time you want to refer to your secret information hold **[Function]** and press **[Secret Menu]** then type in your password.


Complete Password Protection of your Notebook

You can set a Password Lock to protect all the information in your Notebook using your Secret Information Password.




If you have not already done so set-up your password as described in "Set up your Password" above.


Anytime you want to set the Password Lock hold down both **[Function]** and **[Secret Menu]** then press **[Enter]** now you can switch off. When you next switch on you will be asked to enter the password:

Please enter password and press  :


Before the Notebook can be used again the password must be correctly typed and the  key pressed. If you forget the password the Notebook must be completely reset losing all data in it (below). There is no way round this, if there were it wouldn't be secure.

Changing your Password

To change the password enter the Secret Information by holding  and pressing  and typing your current password. Then press the  key:

Please enter old password and press  :

Type in your current password:

Type new password (4 letters or digits) and press  :

Type in your new password. When asked, type it again for confirmation.

Important: If you cannot remember your old password it is impossible to change the password or to access the Secret Information. It must be deleted as described below.

If you forget your password

The password protection on your Notebook is totally secure, so if you forget your password you have no option but to erase your Secret Information or, if you have set the Password Lock, to erase all your work held in the Notebook memory including documents, worksheets, diary entries, addresses etc as well as your Password by resetting the Notebook. This is just one more good reason why you should get into the habit of taking copies of your work on floppy disks. (The secret information itself, however, cannot be copied to disk or printed).

Erasing your Secret Information and Password

To erase the Secret Information:

- 1 Hold down **[Function]** and press **[Error Message]**:

A screenshot of a rectangular box with a thin border. Inside the box, the text "Please enter password and press + : " is followed by a series of small, dark, irregular shapes representing a password mask.

Please enter password and press + :

- 2 Hold down the **[Function]** key and press **[Del]**.

Press **[Y...]** to confirm that you do want to delete the information.
All your Secret Information as well as your Password will be erased.

Resetting Your Notebook

Only do this if you have set a complete lock on the Notebook and then forgotten the password. This will erase all your work stored in the Notebook memory as well as your password. If you are using a memory card the addresses and documents stored on it will not be erased. You should also be able to recover most data from a disk.

Switch off your Notebook then hold down **[Function]** and **[Stop]** together with the **[Del]** key on the right and switch on the computer.

To prevent accidental reset you cannot use "sticky shift" (single key operation).

If the reset is effective you will hear an extended "beep". If you have not held the keys down properly it will not reset. Try again.

Using the floppy disk drive

The simple use of the disk drive, to take copies of your documents, was described in Section 1 of the manual. The following summarises that information and is followed by some more advanced topics:

To format floppy disks before use

A brand new floppy disk must be formatted before it can be used. The Notebook formats its floppy disks in exactly the same way as used for 720K disks in MS-DOS running on an IBM PC compatible computer.

Note there is a second type of $3\frac{1}{2}$ " disk used on PC computers. These are "High Density" disks and have 18 sectors per track instead of just 9. This means that their total storage capacity is 1,474,560 characters (also known as 1.44MB). The Notebook cannot read or write this type of disk. High Density disks are usually identifiable by having an "HD" logo on the disk. They also have a hole punched through them in bottom right corner of the disk.

You can also use the formatting process to completely erase everything that has previously been stored on a floppy disk. This can be quite useful to quickly remove all documents from a disk but you can also see that it could be quite dangerous - you might inadvertently erase hundreds of documents that you had stored on disk. Be careful when formatting disks - be sure that you are formatting the disk you intend to.

To format a floppy disk:

- 1) Switch to the list of stored documents. The quick way to do this is to hold down the Yellow **[Function]** key and press **[F3]**.
- 2) Press **[F10]** followed by **[F]** to select **F >> Formatting and export functions ...**
- 3) Press **[F]** to select **F- Format disk.**
- 4) Press **[Y]** to confirm that you want to continue. Only do this when you are sure that the floppy disk in the drive does not contain any information you want to keep. There is no way to recover information from a disk that is formatted. The formatting process wipes it completely clean.

To copy files from memory to the floppy disk

- 1) Switch to the list of stored documents. The quick way to do this is to hold down the Yellow **[Function]** key and press **[C]**.
- 2) Move the highlighting dark band over each file to be copied in turn and press the Space Bar on the keyboard. The file will be "marked". This is shown by the name being printed in bold text.
- 3) Press the **[Function]** key followed by **[C]** to select the **C - Copy marked files to disk** option.
- 4) Press **[Y]** to confirm the operation. Note that files will overwrite any of the same name that already exist on the disk.

To list the files contained on a disk

- 1) Switch to the list of stored documents. The quick way to do this is to hold down the Yellow **[Function]** key and press **[C]**.
- 2) Press **[Function]** followed by **[L]** to select the **L - List disk files** option.
- 3) The screen will list any files contained in the current directory on the disk (usually \NOTEBOOK). The top of the screen shows the free space on the disk, the current directory and the number of files actually listed in this directory - including the (PARENT) entry.

To copy files from a floppy disk to memory

With the list of disk files showing on screen proceed as follows:

- 1) Move the highlighting dark band over each file to be copied in turn and press the Space Bar on the keyboard. The file will be "marked". This is shown by the name being printed in bold text.

Remember that there may be a delay of a few seconds when you try to move the band if you haven't pressed a key for more than 30 seconds. This is while the disk motor is being restarted.

- 2) Press **[Function]** followed by **[C]** to select the **C - Copy marked files to memory** option.
- 3) Press **[Y]** to confirm the operation. Note that files will overwrite any of the same name that already exist in memory.

Copying Address Book and Diary entries to/from disk

The information that you enter into your Address Book and into the Diary on the Notebook are stored together in two special files. When you look at the List of Stored Documents these files are normally hidden from view. Once they are made visible the two files (with the names "ADDRESS BOOK" and "DIARY FILE") can be marked and copied to the disk just like any other word processor documents. To make the files visible proceed as follows:

- 1) Return to the Main Screen of the Notebook. The quick way to do this is to hold down the Yellow **[Function]** key and press **[Stop]**.
- 2) At the Main Screen press the **[Screen]** key to access the System Settings menu.
- 3) Use the Blue **[Down]** key to move down to the entry called **Document sizes and date display**.
- 4) Use either **[Word]** or **[Edit]** to change this to **Shown**.
- 5) Hold down the Yellow **[Function]** key and press **[F3]** to switch to the List of Stored Documents.

All the documents you have created will have additional information next to their names. The size of the file and the date and time that it was last edited are shown.

In addition, you may see two new entries in the list with the special names ADDRESS BOOK and DIARY FILE. The DIARY FILE and ADDRESS BOOK entries may not exist if you have never used the Diary or Address Book functions within the Notebook.



These two files can be marked with the Space Bar and copied to disk just like any other document file. However, unlike word processor document files, you cannot press **[F2]** while the file has the dark band over it to try and edit it in the Word Processor. These two files hold their information in a special format that the Word Processor cannot allow you to edit.

Notice, that while these special files are visible you can press **[Screen]** and then use **[V]** to delete or **[R]** to rename them. If you delete the files you will wipe out your entire address book or all your diary entries in one operation. Obviously, you should be very careful with these files!


Advanced idea: In fact, because you can rename the files, you could, in theory, keep several different address book or diary files. For each you would enter the information into the relevant section of the Notebook in the normal way. Switch to the List Stored Documents where the files could then be renamed so that you can create a different version alongside. Once complete, that second file could also be renamed. When you want to use a particular file for the address book or diary you would just have to rename it back to ADDRESS BOOK or DIARY FILE.

When the two special files are copied to disk and you then list the files on disk, you will see that their names are changed to ADDRESSB.OOK and DIARYFILE. However, if the files on disk are marked and then copied back to memory you will find that they are renamed back to their original names of ADDRESS BOOK and DIARY FILE. This is the only instance in which names of files on disk are changed when they are copied back to memory.

Quickly editing a Word Processor document from disk

- 1) List the files on disk then move the dark highlighting band over the name of the file you wish to edit.
- 2) Press . The file will be read from disk straight in to the editing section of the word processor. You can then work on the text.
- 3) When you press  the amended file is stored in the memory of the Notebook, not on disk (the original remains there). If you want to update the disk version the document in memory must be copied back to the disk.

Copying and editing Spreadsheet files / BASIC programs

The way in which you copy worksheets produced in the spreadsheet and programs written in BASIC, to and from the disk is absolutely identical to the way that has already been described for word processor documents and the address and diary files. You can either do it from the List of Stored Worksheets or even from the List of Stored Documents. The only difference between the two is that if you list disk files, position the dark band over the name of a file on disk and press , an attempt is made to load that file into the Word Processor if you started from the List of Stored Documents, while an attempt is made to load it into the spreadsheet if you started from the List of Stored Worksheets.

Other disk functions

In the List of Stored Documents press **[Format]** followed by **[F]**.



The **F - Format disk** function has already been explained and the **F - Format Memory card** is explained elsewhere. The two entries of real interest are those to export as ASCII or export as Wordstar. These work in exactly the same way as the **Copy marked files to disk** option that has already been described. However, during the copying process the word processor documents are converted from the internal "Protex" format used inside the Notebook to one of these more standard file formats. These are used when you are taking the text from the files for use in a different word processing program on another computer.

ASCII files will contain only the plain text from the documents. All layout, codes, special text effects, etc are removed. This just produces the simplest text, that can probably be read into virtually any program on any computer.



WordStar files retain some of the formatting information of the word processor documents such as layout, bold, italic, underline, etc. The WordStar format is very popular and most powerful word processing programs (such as Word for Windows and WordPerfect) can import this type of file. (Use the CONVERT program for WordPerfect). In each case, tell the WordProcessor that the file is WordStar 3.3 format.

These two options are described as "Export" functions, rather than just copying functions because the process is only one-way. You can copy an internal "Protex" document to disk as either a WordStar or as an ASCII file but you cannot then copy it back and continue to edit it in the Notebook's Word Processor. In the case of WordStar files you will see all sorts of strange characters have appeared.

You can, of course, copy ASCII files to the Notebook and then edit them in the Word Processor but any codes, layout, etc that they had before they were originally copied to disk will have been lost.



Protecting disk information



3¹/₂" disks can be completely protected so that nothing can be written to them, nothing can be deleted from them and they can't be formatted. Just slide the small shutter in the bottom left corner of the disk (looking at the labelled side) so that the hole is open. To write enable the disk again just slide the shutter so it covers the hole again.





The Notebook also lets you protect individual files on disk. Just list the files on disk. Place the dark bar over the file to be protected, hold down the  key then press . The asterisk that appears next to the name of the file shows that it has been set to "read-only". Repeat the process to set it back to normal.

While a file is set to read-only any attempt to copy a new version to the disk on top of it or to delete the file will stop with the message "The file is read only".

Extra functions for marking files

While either the List of Documents in memory or the list of files on disk is displayed you can hold down  and press  to instantly mark all files in one operation. Typically you would probably do this at the end of each day so that in just a few keypresses you can copy the entire contents of the Notebook memory to a floppy disk.

Another useful key sequence when marking files is  . This will invert the marked files so that all those that were marked before are no longer marked and all those that weren't marked will now be marked.

Once files have been copied to floppy disk you will often want to delete the original copies from memory. Having marked several files you can press   or   to delete all the marked files in a single operation.



Directories on disk

Directories are only really of interest if you intend to use the floppy disks from the Notebook on an IBM PC compatible or some other type of computer that can read MS-DOS format disks. However, they do provide a means of keeping your files/documents in meaningful groups so you may find this of interest even if you don't intend using the disks on another computer.

A directory is a sub-division of the storage space on a floppy disk. You can have lots of directories on a floppy and each can contain a virtually limitless number of individual files. You might have a directory called \PERSONAL in which you store all your personal letters and another called \BUSINESS in which you store your business letters, memos and faxes. All disks, when they are first formatted start with a single directory called the "root" directory (because it is a bit like the root of a tree).

On the Notebook a subdirectory called \NOTEBOOK will also be created on the disk when it is formatted and any files you copy will be placed in this directory unless you arrange for them to go into a different directory as described below.

The reason for having a \NOTEBOOK directory instead of just copying all files to the root directory (referred to as just \) is that there is a limit to the number of files that could be copied to the root directory but a sub-directory such as \NOTEBOOK can, in theory, contain a limitless number of files. In actual fact, the 720K size of the disk will be the only thing that limits how many files can be copied to it.

When files are listed on disk you can "navigate" around the directories contained on the disk by pressing  on the special (PARENT) entry to go back a level in the directory structure towards the root. You switch into a different directory by positioning the dark band on one of the entries that has <DIR> after its name and pressing . The files within that directory (and any sub-directories that it contains) are then listed. The top line of the screen will always show you the "current" directory. As you've seen this normally starts at \NOTEBOOK. So to go up the directory tree towards the root you select (PARENT) and to go deeper down into the directory tree you use one of the <DIR> entries.

When you have changed the current directory, if you press **[Stop]** to return to the List of documents/worksheets stored in memory and then mark and copy some of the files to disk they will be copied into the current directory.

While disk files are listed, if you press **[F5]** you will see that there is an option **N - Make New directory** that can be used to make directories both from the "root" and to make subdirectories within an existing directory.

If, for example, you currently have a disk that contains just four files called first, second, howspell, and spell in the \NOTEBOOK directory, when you press **[F5]** from the List of Stored Documents you will see that directory with those files listed. The dark band will initially be positioned over the (PARENT) entry. Press the **[Enter]** key. The top line of the screen will show that the current directory is now "\" (the root) and this contains one entry - the \NOTEBOOK directory.

You could now press **[F5]** followed by **[N]** to make a new directory. When asked for the name type **personal**. You will then see it listed below the NOTEBOOK entry. If you now move the dark band over PERSONAL and press **[Enter]** it will become the current directory. You could go on to make a sub-directory within this directory called "letters" for example. Then switch to that. When you press **[Stop]** the last directory listed is the current directory and will be where any files you now copy are placed.

Unlike MS-DOS you will find that the **R - Rename** entry on the Disk operations menu can be used to rename directories just as easily as it can be used to rename individual files on disk.

Also, unlike MS-DOS, there isn't a special command to delete directories (RD). You just use the **D - Delete** entry to delete directories as well as files, however, if you try and delete a directory that contains any files or sub-directories you will see the message "The file is read only". You must delete all entries from within a directory before the directory entry itself can be deleted.

System Settings

The system settings menu is accessed only from the main screen by pressing **System**. You can switch to the main screen with **Function****Stop**.

Changes you make to these settings don't just affect the current usage of the Notebook. These settings will be in force each time you come to use the Notebook until you change them or the batteries are disconnected for some reason.

The factory settings are as follows:

Use ↑ ↓ ← and →. Stop to Finish		
Power off delay (mins, 0=Never)	(5)	5min
Preserve context during power off	(No)	No
Document sizes and date display	(Not shown)	Not shown
Date format	(dd/mm/yy)	dd/mm/yy
Screen back light	(Auto)	Auto
Document format (serial/Lapcat)	(Protect)	Protect
Sticky shift keys?	(No)	No
Time display format	(24 hour)	24 hour
Audible diary message warning	(Yes)	Yes

Automatic Power Off delay

If you find the automatic power off time of 5 minutes is too long, reduce the time to between 1 and 4 minutes. You can also increase it if you wish. Use a value of 0 if you want to prevent the Notebook from ever powering off automatically. Do not use 0 (never) if you are running the Notebook from the batteries as this will prevent automatic power off occurring.

Preserve Context

If, when you switch on, you want your Notebook to return to the screen you were using when you switched off change this setting to Yes. Context is always preserved when automatic power off occurs.

Document sizes and date display

These will show against the name of each document in the List Stored Document\Worksheet screens. The size of each document is shown in bytes with the date and time you last edited the document\worksheet.

The U, C or L after a name is only of any interest to you if you start to run out of memory and need to delete documents, delete those

in the Lower memory (L) to make room when you are editing a large document. See the Troubleshooting section for more details.

Date format

Use this option to change the format of the date displayed when the date/time display is set to "Shown". The date format can either be day/month/year as used in the UK, month/date/year as used in the US or year/month/day as used in Japan.



Backlight

As described at the start of Section 2, this can be set to Auto, On or Off to determine how the back light behaves when the Notebook is switched on. Changing this option does not immediately switch the back light on or off, it only affects what happens subsequently when the Notebook is switched on.



Document Transfer Format

Use this to set whether the Lapcat (Parallel) transfer should send documents as Protext, WordStar or ASCII. A Lapcat cable and software is available from Arnor. Contact them for more details. This setting just mirrors the similar setting in the configuration menu of the Serial Terminal program.

Sticky Shift keys

To allow one-key operation of the Notebook switch "sticky shift" on, where normally you would have to press two keys at the same time, this allows you to press one after the other. So, for example, to spell check a document when word processing you could first press the YELLOW  key then press .

Time display format

To change the time display to the 12 hour clock use the   cursor keys. Note that this only affects the display of time. You must still use the 24 hour system when setting the time or alarms.

Audible diary message warning

When set to Yes a beep will be produced each time you return to the Main Screen if there is an unread diary message today.

Word Processing Guide

For step by step instructions for beginners read Section 1.

Detailed instructions on how to use your word processor are given in this section.




Starting a New Document

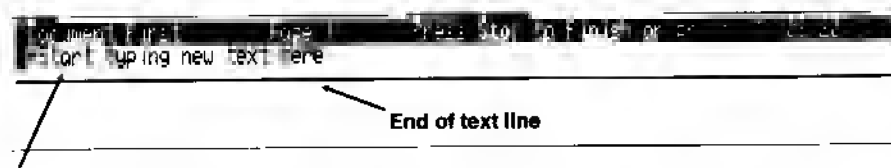
You have to type a name for every document before you start, the name can consist of up to any 12 characters, the document is stored under this name and you can not have two documents with the same name.

At the main screen hold down YELLOW and press RED to reach the main Word Processing screen then press RED.

Type in a name for your document;

Choose a name that will remind you of the contents of the document so that you can easily identify it later.


Any 12 characters can be used, if you make a typing error use  or  then retype. Press  when you have finished.



This text will disappear as soon as you start to type

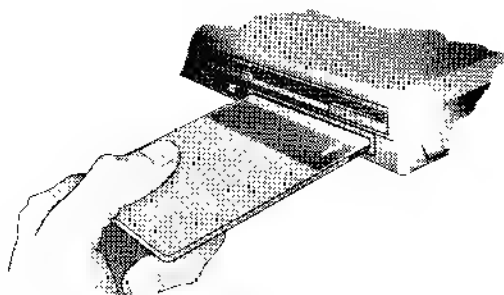
You can now start typing just as you would on a fresh sheet of paper in a typewriter.

Saving a Document

Documents are saved ("stored") automatically when you press . If you have a memory card loaded the document will automatically be stored on the card.

A document already stored in the Natebook memory can be moved to the memory card as follows:






- 1 Switch the Notebook off.
- 2 Insert the Memory Card, carefully but firmly into the Memory Card Slot on the left side of the Notebook.




- 3 Switch the Notebook on.
- 4 "Edit" the document you want to store on the card (that is, bring the document to the screen):



Hold YELLOW and press RED at the main screen.

Press GREEN at the Word processor menu.

Use the     keys to highlight the name of the document then press .

With the document on the screen press .

The document is now stored on your Memory Card and has been removed from the Notebook memory.

To copy documents from a card into the Notebook memory set the "write protect" switch on the card to on, edit the document then press . An attempt will be made to write the document to the card but this will fail. You are warned that the card is write protected. When you press  again the document is stored in the Notebook's own memory.

Details of how to copy word processor documents to disk are given in Section 1 of the manual. More details were also given earlier in "Using the floppy disk drive".

Large Documents

The size of any single document is limited to about 38,000 characters. This is a limitation of the Notebook's design and cannot be increased by using a memory card. Adding a memory card will, however, let you store many more documents in memory.

When you start to run out of memory you will see a warning message on screen, copy any old documents that you wish to keep to a floppy disk then delete old documents and diary entries to increase the "free memory" space.

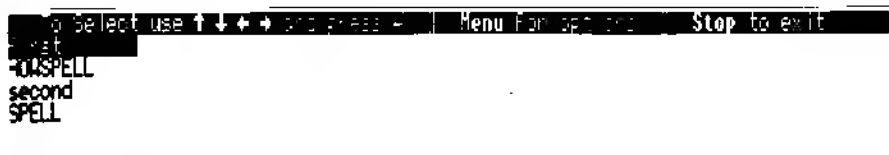
To show how many bytes of memory you **have available**, and how many bytes each document uses you must show "Document sizes and date display" using the System Settings menu (see "System Settings").

When document sizes are being shown a letter U, L or C appears next to each name to show if it is in the Upper memory, lower memory or on the card. It is the lower memory area that is used when a document is actually being edited so it is best if you can clear space by copying to disk and then deleting documents with an L shown next to their name.

Deleting a Document

Delete documents if your Notebook after copying them to disk when the memory becomes too full, or if you want to remove a confidential document from memory. Delete a document as follows:

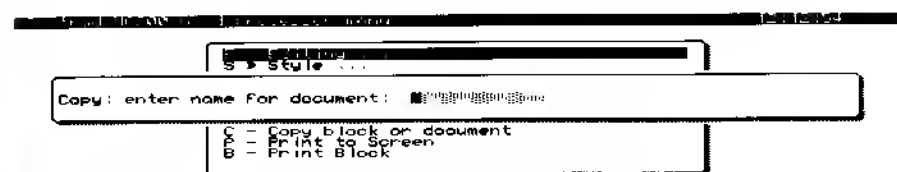
- Hold down YELLOW and press [F4].



- Select the name of the document you want to delete using the [Word] [Case] [Copy] [Spell] keys.
- Press [Cancel Menu].

Copying a document

With the document on the screen press **[F5]**, then press **[C]** to copy the document, you will see the following message:

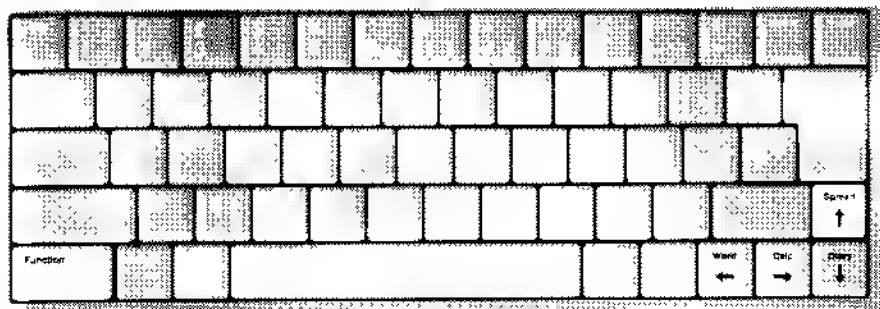


Type in a new name for the copy then press **[Enter]**. You will be returned to your original document and the copy is stored. The copy can be edited in the same way as any other document.





There are several reasons you might have for wanting to copy a document, one example might be that you have typed a letter, then want to send a similar letter to someone else but you do not want to re-type it and you want to keep the original stored in your Notebook. Alternatively, if you are about to make major changes to a document you may like to take a copy that you can revert to if anything goes wrong.)

Typing a Document

If you have not used a word processor before you need to get used to the feel of the keys, as well as learn what all the keys do. When typing a light touch is required, if you hold a key down for too long it will be repeated on the screen until you release it.




cursor

The cursor is the "flashing oblong" that marks your position on the screen, as you type the cursor will move ahead. When revising a document you can move the cursor using the     keys.



Hold down one of the SHIFT keys then press a character key to type the upper case letter or symbol, the upper case symbols are printed on the top half of the key.



Press to switch to typing all capital letters, you still have to use SHIFT to type the upper case symbols. Press  again to switch capitals off. When the caps lock is on a "C" shows in the top right hand corner of the screen. In the spreadsheet it shows as "c".



Press twice when you want to start a new paragraph. Use to start a new line when typing (for example) a list.




Use to delete text, if you want to delete more than a few characters you should use one of the other delete methods described below.



Use to align text into columns and to indent the first line of a paragraph. (To indent a whole paragraph requires a different procedure - see later section on Aligning text using Ruler Lines.)

How Not to Type:

If you have used a typewriter before but not used a word processor it is important that you remember:



Not to press  at the end of each line, only when you start a new paragraph. The text automatically wraps to the next line as you type.

Not to use the spacebar to move the cursor or to indent or align text. Only use the spacebar to insert a space between words. Instructions for indenting and aligning using tabs and rulers are given later in this manual.





Page size

As you type the line will move down the screen, when you have typed a page of text a "page break" bar appears on the screen showing where the page will finish when printed, the word processor is set to print on paper with 66 lines but this can be changed using the "Layout" menu (if you want to do this refer to the chapter on Page Layout).




Correcting typing errors

If you make mistakes while typing you can use the   keys to delete single characters, or hold down one of the keys to delete several characters. There are other ways of deleting a line of text or a large section (called a "block") of text, these are described below.




Moving around a Document

Moving around a document really means moving the cursor around. Using the     keys on their own will always work, but you may find this a bit slow especially in larger documents. The following methods will move the cursor around quickly.

**page of a time forwards
or backwards**

Hold down  and press  to go back or  to go forwards (you don't have to remember this just refer to the Template on the Notebook).

word at a time

Hold  and press  or  to move to the beginning of the previous or next word.




to the start of a line

Hold  and press .

to the end of a line

Hold  and press .



a screen of a time

Hold down  press  to go up or  to go down the document 14 lines, there is an overlap of one line that enables you to scan through a document using the minimum of keystrokes.



to the start of the document -

Hold down  and press .



to the end of the document -

Hold down  and press .

Inserting Text

To insert new text into existing text just position the cursor and type, the existing text will move along to make room. You must have the "Insert" mode ON when you do this, otherwise the old text will be deleted as you type. Hold down the  key and press  to switch "Insert" on or off (you don't have to remember this just refer to the Template on your Notebook).

Typing over existing text






To type over existing text first hold  and press  to switch Insert off then position the cursor over the text you want to replace and type. The old text erases as you type. Remember to switch Insert back on when you have finished.

Deleting Text in a Document

The delete keys  and  will always delete text, if you press the key one character will be deleted, if you hold down the key





deleting will continue until you release it. However there are other ways to delete large sections of text as described below:

Delete a word - Hold down  and press  or .

Delete a line - Hold down  and press  or  to delete all text from the cursor position to the end or beginning of the line or hold down  and press  to delete the whole line. (Refer to the Template if you forget which keys to use.)

Delete all text in the document - Hold down  and press .

Undeleting words, lines and blocks

Deleted text can be restored if you used the  or  keys to delete the text, not if you just used the   keys on their own.

The text is restored to the cursor position, so you can use the Undelete function to move text around within the document.



To undelete hold down  and press .


There is a limit of 1024 characters that can be recovered in this way.

Undelete is also available in the "Editing menu".)

Changing Case



You can change the case of the text (that is, from capitals to small letters or from small to capitals) without re-typing the words.

Hold down  and press  to change a small (lower case) letter to a capital (UPPER CASE) letter.

Hold down  and press  to change a capital to a small letter.



Keep the keys pressed down to change more than one letter.




Swapping Characters

A common typing error is to type two characters in the wrong order for example "wrod" instead of "word". To correct this error quickly use the swap characters command. Position the cursor on the "r" of wrod then hold  and press .



Formatting text

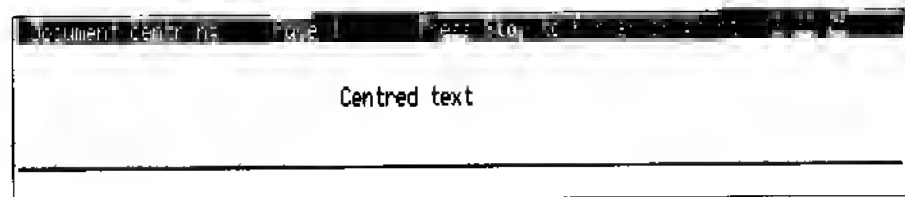
If you have justification and word wrap switched on you will notice that as you type words are moved to the following line and spaces are inserted so that the text is laid out correctly.

If after changing layouts or inserting text you find paragraphs that are not correctly laid out, move the cursor anywhere within the paragraph and hold down the  key then press .

To make sure the whole document is correctly formatted press the  key followed by  to select Text formatting and then  to select Format text.

Centring text


To centre text on a line use the "Centre" command. Type the text to be centred then, with the cursor positioned anywhere on the line hold down  and press .



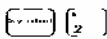



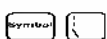
If you make a change to the text later use the same command again to re-centre it.

Accented and special characters

The most commonly used European accents can be typed into your Notebook documents in the following way.


















Hold down  then press the key indicated on the table below for the accent you want, release both keys and then type the letter

that you want to be accented. You will not see the accent on screen until you have typed the letter.

Accent	Keys	Valid letters*
Umlaut		aeiouAOU
Ring		aA
Circumflex		aeiou
Acute		aeiauE
Grave		oeiou

Note that only the accented letters that are included in the "Special Characters" menu can be typed.

The following common language symbols are available using the keys shown:

ç		Ç	 
ñ		Ñ	 
¿		!	
©		Æ	 
«		»	
ß		μ	
1/4		1/2	

Special Characters

All of the above, and many more symbols, are available in the Special Characters menu. (Also refer to the chapter on Macros to see how you can assign any of these to a key of your choice).

A variety of characters other than those printed on the keyboard are available to insert into your documents.

Hold down the **System** key and press **Option** to see all the characters available.



to move
to insert
to exit

Use the **Left Arrow**, **Right Arrow**, **Up Arrow**, **Down Arrow** keys to highlight the character you want to use and then press **Enter**.

(These characters can also be inserted into address book or diary if stored as macros first - refer to the chapter on Macros).

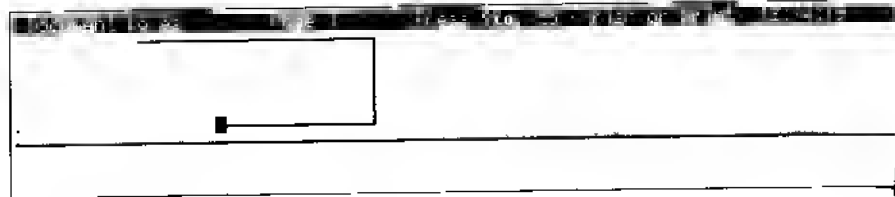
Note: Whether these characters are actually printed on your printer is dependent on which printer you use and how it is set up.

Drawing Boxes

Horizontal lines, vertical lines and "corners" can be drawn on screen and used to "box" text.

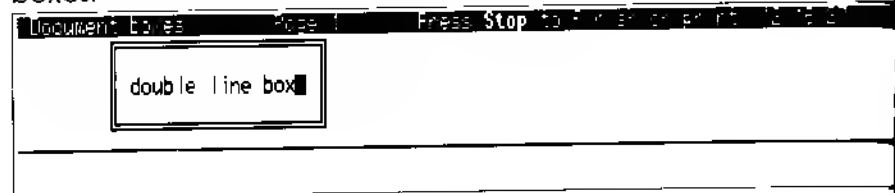
Using single box line characters

To draw single line boxes hold down the **System** key and use the **Left Arrow**, **Right Arrow**, **Up Arrow**, **Down Arrow** keys to draw the box. To draw the corners just "drive around the corner of the box with the cursor.



Double line Boxes

To switch double lines on or off hold down the **System** key and **Option** together and press **Enter** then continue as you would for single line boxes.



To insert text into a box you have drawn switch Insert Off.

As well as the single and double box line characters you can have boxes drawn using a character of your own choice. Hold down [] and [] and press []. You will then be asked to type the character to be used.

To switch back to using the previous line box characters press [] [] [].

To print ← → ↓ ↑ characters on the screen hold down [] [] Press [] then hold down [] and press [] [] [] or [].

Note that the boxes will only print correctly if the printer and Notebook are set up correctly before starting to print.

Viewing Codes

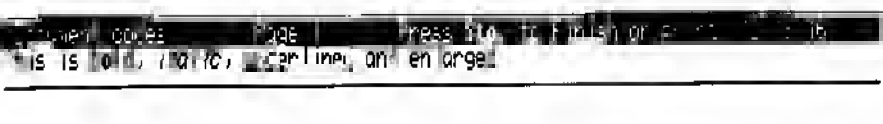
Codes are used to control the special features of a printer, such as underlining, different sizes and styles of print, subscripts and superscripts. How to insert these codes is explained in the section "Changing text appearance". You have a choice when working in a document whether you see the codes or not.

Turn the display of codes on or off by holding down the [Function] key and pressing [].

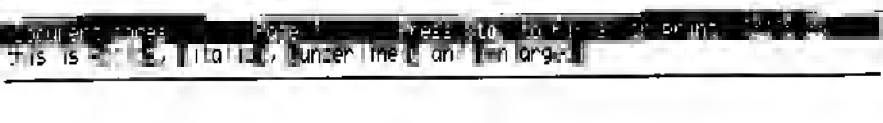
When codes are off your Notebook shows underlined, italic and bold text on the screen but features like subscript or condensed print cannot be shown.

Remove codes by showing them on screen then deleting them as you would any other character.

Codes Off



Codes On



Viewing returns, tabs, ruler lines and spaces

The non-printing characters can all be switched "on or off" on the screen. Hold down [symbol] and press [V] then type one of the following letters:

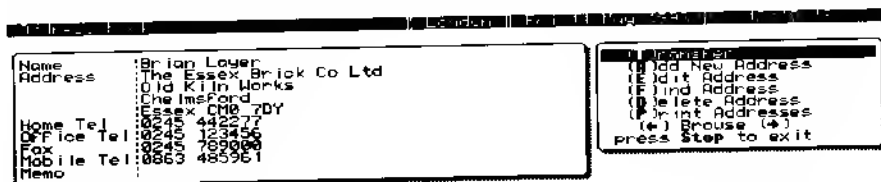
- [L] status line on/off
- [S] spaces on/off
- [R] ruler lines on/off
- [T] tabs and returns on/off
- [V] codes on/off

Inserting the Current Date or Time into a Document

With the cursor at the position you want the date to be inserted hold down the [symbol] key and press [D] to insert the current date or hold down [symbol] and press [T] to insert the current time.

Inserting an Address from your Address Book into a Document

To insert an address from your address book into the document you are typing first position the cursor on the line where you want the address to appear. Then hold down YELLOW [Function] and press [D], this will take you directly to the address book:



Use [Left] [Right] or "Find" to find the address you want to insert then press [T] to "Transfer". The name, address, telephone numbers and memo will then be inserted into the document at the left margin. Use [symbol] [E] to delete the lines you don't want. Use [symbol] to position the address lines across to the right if required.

Inserting one document into another

With the document on the screen, position the cursor where you want the second document to be inserted hold down **[Function]** and press **[2]**. Highlight the name of the document you want to insert then press the **[Insert]** key followed by **[5]**. This could be used for inserting standard paragraphs.

Moving, copying and deleting blocks of text

Before you can move, copy or delete a block of text you must first mark the block. (The block editing commands are given on the Template.)

Marking a block

First mark the start of the block by positioning the cursor on the first character then hold down **[Function]** and press **[9]**, mark the end of the block in the same way.

To quickly move to the start or end of a block hold down **[Control]** and press **[V]** then press **[1]** or **[3]**.)

There are codes in your document for bold or underlining etc, these will show on screen as you mark the block. This is to help prevent you leaving the codes behind when you move, copy or delete a block.

Move block



First mark the block as described above then position the cursor where you want the block to be inserted and hold down **[Function]** and press **[4]**. The block will move from the old position to the new.

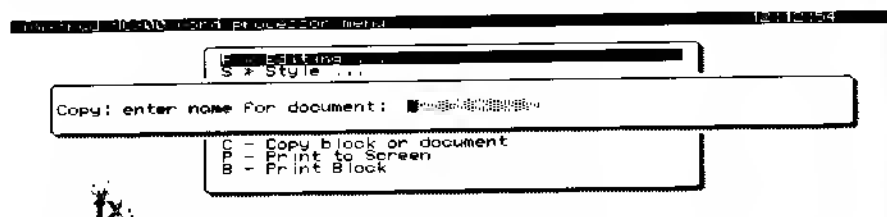
Copy block


First mark the block as described above then position the cursor where you want the block to be repeated and hold down **[Function]** and press **[6]**. The text will be copied.

Store a block as a separate document

Storing a block as a separate document allows you to insert that block into other documents (as described above).

First mark the block as described above then press . Press  (to "Copy block or document") you will see the following message:



Type in a name for your block then press , you are returned to the document and your block is now stored.



Delete block

First mark the block as described above then hold down  then press  (refer to the Template).

Undelete block





To restore a deleted block position the cursor where you want the block and hold down **Control** and press **U**.

To unmark a block

When you have finished working with a block hold down  and press . This clears the square bracket codes and the highlighting from the screen. You cannot mark another block before you have unmarked the first.

Changing text appearance (bold, italic, etc.)

Italics

To change text to italic use the "Italic" command. Position the cursor at the beginning of the text to be italicised and hold down  and press  then repeat this at the end of the text. If you want the word to be italic as you type hold down  and press  before you start typing then do the same again when you have finished.

The text will show as italic on screen only if Codes are OFF. If Codes are ON you will see two highlighted letter "i"s in the text; these are the Italic "Codes". To turn Codes on or off hold down **[Function]** and press **[F4]**.

Cancel Italics

To cancel the italics command you must delete the italic "codes". To do this the codes must be showing on screen, if they are not hold down **[Function]** and press **[F4]**. Delete the highlighted "i"s by positioning the cursor on them and pressing **[Delete]**.

(Note that whether italics appear in the printed document will depend on the printer you are using and how you have set up the printer and Notebook before printing.)

Bold

To embolden text position the cursor at the beginning of the text to be bold then hold down **[Control]** and press **[B]**, do the same at the end of the text. If you want text to be bold as you type hold down **[Control]** and press **[B]** then start typing, when you have finished hold down **[Control]** and press **[B]** again.

The text will show as bold on screen or you will see two highlighted letter "b"s in the text; these are the bold "codes". To turn these codes on or off hold down **[Function]** and press **[F4]**.

Cancel Bold

To cancel the bold command you must delete the bold "codes", to do this the codes must be showing on screen, if they are not hold down **[Function]** and press **[F4]**. Delete the highlighted "b"s by positioning the cursor on them and pressing **[Delete]**.

Note that whether bold appears in the printed document will depend on the printer you are using and how you have set up the printer and Notebook before printing.)

Underlining

To underline text position the cursor where you want underlining to start then hold down **[Control]** then press **[U]**, repeat this where underlining is to stop. If you want to underline the words as you type hold down **[Control]** and press **[U]** before you start typing then hold **[Control]** and press **[U]** again when you have finished.

Note that whether underlining appears in the printed document will depend on the printer you are using and how you have set up the printer and Notebook before printing.)

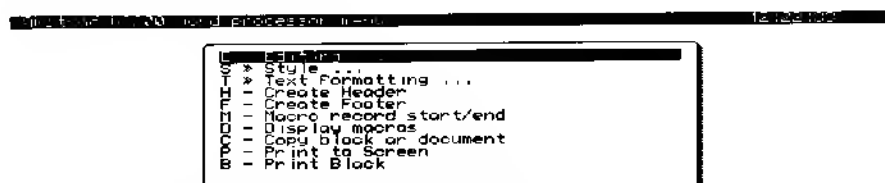
Other effects available in Notebook's style menu

The Notebook will print your documents with 10 characters per inch (also known as "Pica") but there are other options available in the Style menu.

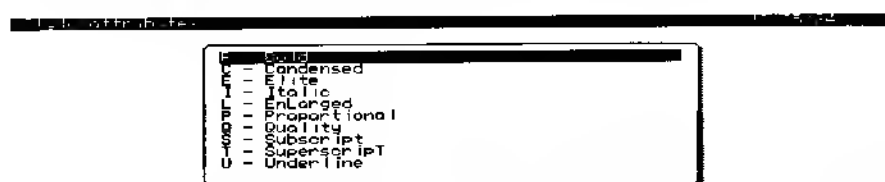
Whether the changes you have made appear on the printed document will depend on the printer you are using and how you have set up the printer and Notebook before printing.

How to change the character size or style

- 1 Position the cursor at the beginning of the text you want to change.
- 2 Press the **Format** key.



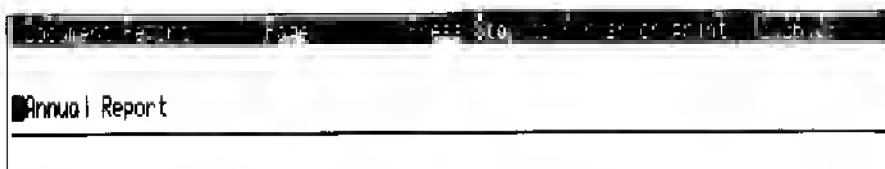
- 3 Now select the Style menu by pressing **S** or by using the **Word** key then pressing **↓**.



- 4 Select the style you want using the (cursor) keys and press **↓** or by typing the letter to the left of the option.

(Note that some combinations of styles will not print together.)

- 5 A code will be inserted into the document.





The code should also be inserted where you want the style to finish. Position the cursor then repeat the above procedure. You should end up with something similar to the following:



Place markers

You can insert "place markers" into a document in order to get quickly to a particular place. You can have up to 10 individual markers or a limitless number of multiple markers.



Insert markers into the document by holding down  and pressing  and then typing either a number from 0 to 9 for individual markers or a ? for a multiple marker. (A message appears on the status line showing which characters can be used.)



Use the same command when you want to go to a particular place marker, to a block marker or to the Left or Right margins of the text.

To go to the next marker of any type hold down  and  and press . To go to a previous marker press .

Special formatting characters

There are several special characters that you can insert into the text of your document to control the way in which it is formatted. The special characters are as follows - soft hyphen, non break (hard) hyphen and non-break ("hard") space.

You put a soft hyphen in the middle of a word where you would not mind it being broken and hyphenated if it had to be split across the end of a line. Without a soft hyphen the whole word would just be word wrapped onto the following line. You type a soft hyphen by holding down  and pressing . It is shown on screen as an inverse hyphen.

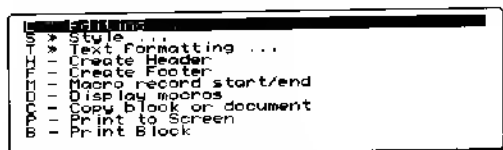
A non break space is typed by pressing   followed by the space bar. It has the special property that it will always be kept together with the characters before and after it as if the two

separated words were just a single word. This is useful in the case of peoples names where you want to keep their initials with their surname. Mr. C J Lowson might be broken if it occurred at the end of a line. But by typing the spaces between "C" and "J", "C" and "J" and "J" and "L" as hard spaces the whole thing will behave as a single word.

Similarly, a non-break ("hard") hyphen is used when you wish to type a hyphenated word but do not want it to break across the end of a line. You type a hard hyphen by pressing **Control-N** followed by **Enter**.

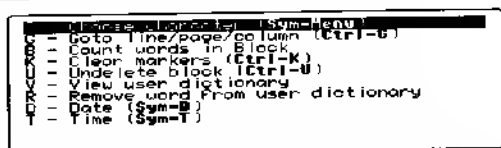
The word processor menus

There are various menus of word processing functions that can be accessed by pressing the **Control-N** key when a document is on the screen.



Some of the options have an immediate effect when selected, others require additional actions.

There are quick-key alternatives to some of options that are available in the Editing and Text formatting menus and these are shown in the menus:



The quick-key alternatives all require two or three keys to be held down at once, so for example **(Ctrl-K)** means hold down the **Control** key while you press **K**. "Ctrl" and "Sym" are abbreviations for "Control" and "Symbol".

To get out of a menu at any time press **Control-N**, until you return to your document.

or instructions on how to use particular options refer to the relevant chapters in this book.

List of Documents

Hold down **[Function]** and press **[2]** to quickly access the List Stored Documents screen while you are editing a document. To rename, delete, insert, print or edit another file press **[Menu]** then select the option you want. Hold down **[Function]** and press the Red **[←]** key to return to the document you were editing.

To get to the List Stored Documents screen from other parts of the Notebook program hold down **[Function]** and press **[F3]**.

Note that the list of stored documents will only show a maximum of 248 files/documents. If you have more, only the first 248 will be listed and the number of documents at the top right will show "248+".

Headers and Footers and Page Numbering

Headers and Footers are lines of text which print at the top and bottom of each page within the header and footer margins. A page number can be inserted that will automatically increment.

The commands to insert headers and footers are "Stored Commands" and for more information on stored commands refer to the section later in this manual.

Headers and Footers

The header prints at the top of the page within the header margin, if you want more than 3 lines of header you will have to change the "header margin" (refer to the section on page layout). The header will print on the top of the header margin, a footer will print at the bottom of the footer margin.

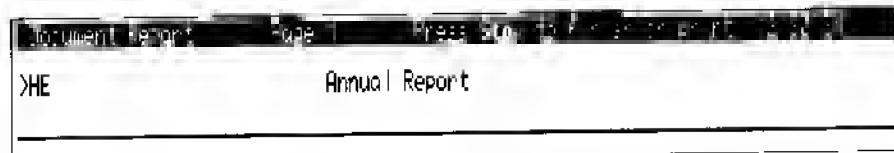
Inserting header or footer text:

With the cursor positioned on the first line of your document press the **[Function]** key. Then press either **[H]** for header or **[F]** for footer.

The header command is inserted into the document and you can now type the text that you want to appear in the header or footer, eg:



- 3 If you want to centre the text you can do so by holding down **Control** and pressing **G**. Note that the > must be in column 1 (on the extreme left of the screen) for a header or footer to work.



Differing header and footer text on odd and even numbered pages can be included using some of the advanced Stored commands. Refer to the section on stored commands for more information.

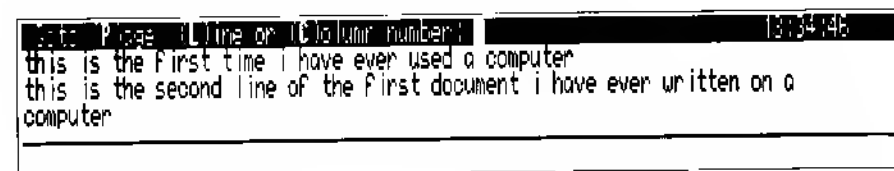
Page Numbering

Page numbers will automatically be inserted where you type a percent (%) symbol in a header or footer. Page numbering will start at 1 but you can change this using the PN command, refer to the section on stored commands for details.

The Go To Command

This is a useful command if you have a long document. You can go directly to a specific line, column or page number. If you want to see line and column numbers you will need to switch the "Status" line on by pressing **Function** **S B**.

Hold down **Control** key and press **G**.



Type in the letter p, l or c then the number, for example to go to page 2 type: p2.

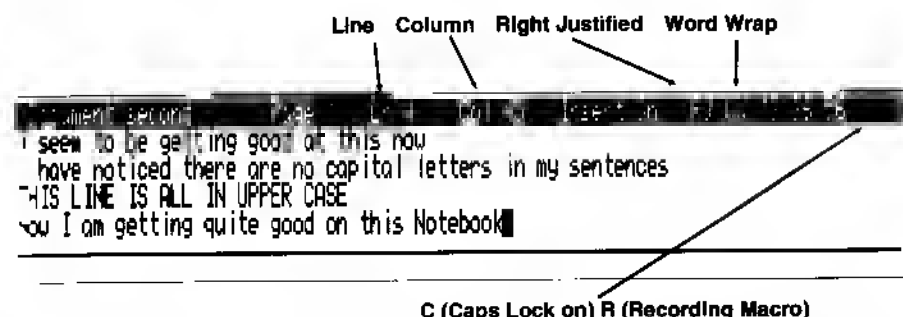
The line number you can give as a destination is the number counting right from the very start of the document. Normally, the line numbers shown on the screen are only shown from the last page break. To switch to displaying "absolute" line numbers hold down **[F10]** and **[^]** then press **[P x]**.

The Go To command is also available at the Editing Menu.

Status Line

The line across the top of the screen when you are typing a document is called the status line. Your Notebook has two types of status line, a simple one for beginners and a more detailed one for advanced users.

Hold down **[Function]** and press **[E 8]** to switch on the status line.

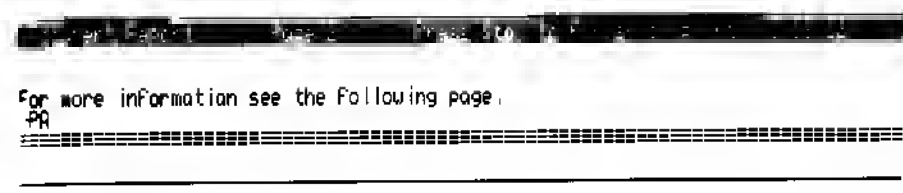


C (Caps Lock on) R (Recording Macro)

Word wrap and right justification can be switched on or off at the **[Function] [E 3]** menu. Insert mode can be switched using **[Function] [E 4]**.

Page break

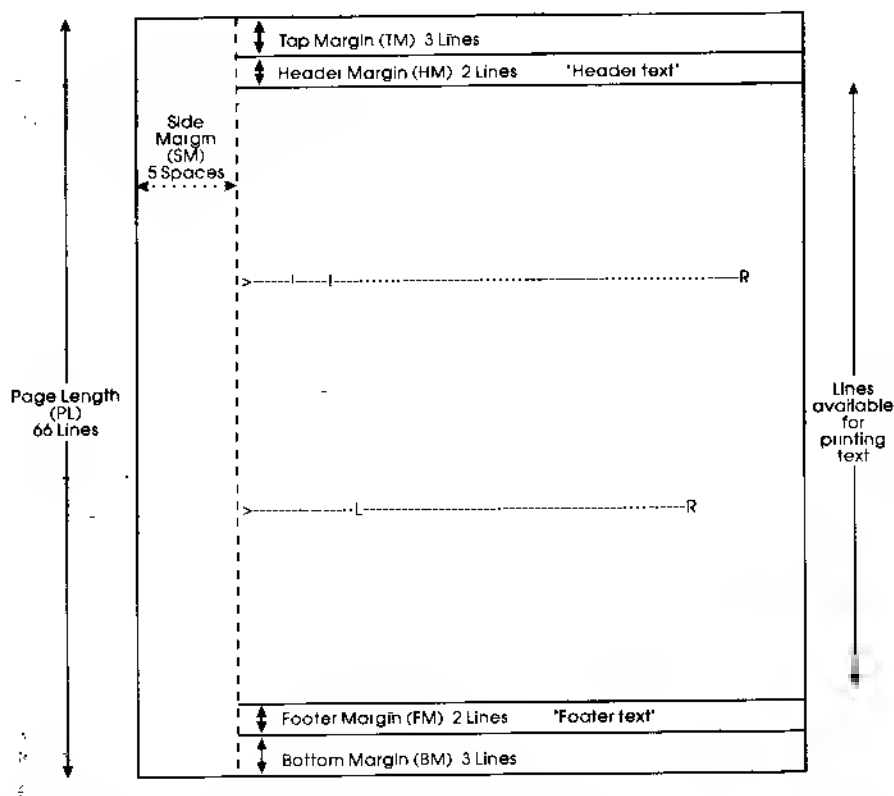
Page breaks will automatically occur at the position determined by the page layout. If you want to force a page break before this hold down **[Function]** and press **[P x]**. The page break stored command will be inserted into the document:



Page Layout

The way your Notebook "lays out" the text on the paper can be altered by changing the "Layout" menu and inserting Ruler Lines.

The illustration below shows how the margins and ruler lines affect the page layout.



The text is printed immediately to the right of the side margin. To centralise the text on the page the R on the ruler line must be correctly positioned.

To indent a paragraph insert a ruler line (see below) with an L where the text is to start.

Layout Menu

Use the Layout menu to alter the margins that will appear on the printed page; hold down **[Function]** and press **[F7]**:

Page Layout Overtyping or **++** to change, **↑↓** to move, **Stop** to Finish

Page length (lines)	(66)	66
Top margin (lines)	(6)	6
Header margin (lines)	(6)	6
Footer margin (lines)	(6)	6
Bottom margin (lines)	(6)	6
Side margin (chars)	(5)	5
Line spacing (lines)	(1)	1

Use **[↑]** or **[↓]** to select the margin or other value you want to change, delete the current value using **[C]** then type in your new value and press **[Enter]**, change line spacing using **[Word]** **[←]** **[→]**, when you have completed all the changes press **[Stop]** to return to the editing screen.

Page Dimensions

The settings in this menu govern the length of the page on your notebook screen and should be compatible with the paper you want to print on, if the settings are wrong the document may not print onto paper in the correct position.

Page Length:

This is expressed as the number of lines on the page, there are 6 lines to an inch, so, for example, A4 paper has 70 lines.

Top and Bottom Margins:

The blank areas at the top and bottom of each page. You may want to adjust these if, for example, you are using headed notepaper and need to increase the top margin so printing starts further down the page.

It is important to note that many printers are physically unable to print on the top and bottom few lines of a single sheet of paper and you must allow for this. For example, if your printer cannot print on the top inch of paper, make the top margin at least 6 lines.

Header and Footer Margins:

The header and footer margins are ignored if there is no header or footer text to print. If you have inserted a header or footer make sure you allow enough margin for it.

Aligning Text using "Ruler Lines"

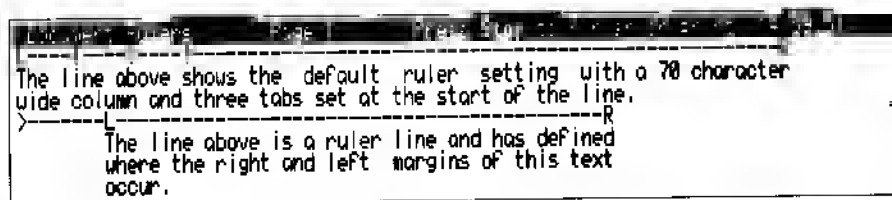
Ruler Lines enable you to align the text in different ways, for example if you want to indent a paragraph (on the left or right) or type a table of figures, create a Ruler Line setting left or right indents and tab positions where you want them.

All the text after the ruler line will conform to it.

Inserting a Ruler Line

To insert a Ruler Line into a document simply type a "greater than" symbol (>) at the start of a new line, type an "L" where you want an indented left margin, exclamation marks (!) for tab positions and an "R" where you want the line to finish. Use hyphens between the symbols, this is not essential but it does make the ruler line easy to pick out on the screen. All the text after the ruler line will conform to the new format that it defines, until another ruler line is inserted.

The following is a typical example of using a ruler line:



The ruler line display has been switched on (**Control**+**V** **R**) and is currently showing the default ruler line which is used when you start a new document. This applies to the first two lines of text but the third line of the document defines a new ruler and the remaining lines conform to that new layout. In this case it has defined indented left and right margins. Although you type ruler lines into your document just like any other line, they are not printed - this is true of any line that has a ">" character in column one. See also the description of "Stored commands" later in the manual.

When you start a new document, there is already a standard ruler line set up like the one above, this will not be visible unless you change "Show Ruler" to YES in the Configure menu. Ruler lines are not printed.

```

-----R-----
1> This paragraph is indented on both sides. Text can be
> inserted to the left of the margin to enable you to number
> the paragraph.

```

```

-----R-----
1> (a) Position the cursor on the outside margin using the
> cursor keys then press the tab key, type the number then
> press tab and start typing the paragraph.

```

```

1> (b) Always use tabs to align text - they make re-alignment
> easier when you make any changes and are essential for
> typing tables, for example:

```

```

-----R-----
1>                               Baguette Sandwich Roll
>
> Cottage Cheese→           1.30→      1.10→      0.90
> Provencal→                1.30→      1.10→      0.90
> Bacon & Avocado→          1.60→      1.30→      1.10

```

```

-----R-----
1> When you want to revert to using the standard ruler line hold down the
> Control] key and type "d". The standard ruler line is inserted.

```

As shown by the above, various parts of your document can be set out under different rulers so each part has its own format. At any time, while editing, you can hold down [-----] and press [R] which will insert the "default" ruler - that is, a ruler identical to the one that is normally in force before you enter any new ruler line. Also, you can use [-----]R to insert a new ruler which is a copy of the ruler that was used above the current ruler. You might use this when you want a paragraph or two laid out in an unusual format and then wish to instantly switch back to the ruler that was in use preceeding this.

These functions are also available in the text formatting menu.

Deleting or Editing a Ruler Line

The Ruler Lines that you insert can be deleted or edited in the same way as all the other text. Move or insert more tab positions at any time by inserting and deleting exclamation marks.

Using Tabs

Set tab positions on your ruler line by typing exclamation marks (!) then use the tab key ([-----]) to move from one column to the next.

When using tabs it makes work a lot easier if you show the tab characters on screen, to do this hold down **[Function]** and press **[F3]** to get into the Configure menu:

0000000000 Overtyp e or ← → t o change, ↑ ↓ t o move, Stop t o finish

Find and Replace

When you want to find a particular word, or piece of text within a document you can use Find. To find the word or text and replace it with different text use Replace.

To use "Find" hold down **[Function]** and press **[F5]**, type in the word or text to find and press **[Enter]**. To find and "Replace" hold down **[Function]** and press **[F6]**, type in the text to find press **[Enter]** type the replacement text and press **[Enter]**.

The following characters and the printer control codes cannot be entered directly into the text to find or replace but you can enter them using an exclamation mark as follows:

Printer control code	! <letter>
question mark	!?
exclamation mark	!!
hard return	!.
soft hyphen	!-
non-break hyphen	!_
non-break space	! <space>
search for specified code	! <number>

Wildcards - a question mark (?) can be used to represent any single character except for a **[]** and you can use an unlimited number of wildcards. So, for example, to find all the occurrences of "recognize" and "recognise" you should type in "recogni?e" as the text to find.

When you have entered the text you can press return for a simple search forwards from the current cursor position to the first occurrence, ignoring the case of letters and finding the text even if it occurs as part of a longer word and asking for confirmation before replacing a piece of text.

You can select one or more of the search options. The options are:

- G** - global: Search the whole document from the start regardless of where the cursor was when selecting "Find".
- C** - match case: Only find occurrences where upper and lower case matches with the text you have entered.

- B** Search backwards from the cursor position to the start of the document.
- W** Only search for whole words.
- A** Find/find and replace all occurrences to the end of the document, the total number of occurrences/replacements is given on screen when finished.
- n** Find the *n*th occurrence of a piece of text. Type any number up to 255.

Using Find

Once you have typed the text and selected the options, if any, you are returned to the document and the cursor will be on the first occurrence. To find the next occurrence hold down **[F3]** and press **[F4]**, to search back for the previous occurrence hold down **[F3]** and press **[F5]**. If not found a message **xxxx not found** will appear on the status line and you will hear a beep.

Using Replace

The cursor will be positioned on the first character of the first occurrence of the text to find and a messages, **Replace (y/n) ?** will be displayed. Press **[Y]** to replace the text and move on to the next occurrence. Press **Notebook** to move onto the next occurrence. To finish finding and replacing press **[Stop]**.

Examples:

To find all occurrences of the word "text" in lower case only, starting at the cursor position:

Find:	text
Options:	GW

To convert all occurrences of "plc" or "Plc" to PLC, confirming each replacement:

Find:	plc
Replace with:	PLC
Options:	GW

to find the 12th 8 letter word:

Test of word



Find:
Options:

????????
WG12

Using Macros

What is a Macro?


A macro is a sequence of keystrokes stored together so they can be reproduced by using just two or three keys. So, as a simple example, you can save a frequently used phrase to save yourself having to re-type it every time. At a more advanced level you can use Macros to execute commands or to quickly insert a "Special Character" into your document.

A few macros are already on your Notebook; for example when you insert the current date into a document by holding down  and pressing  you are using a macro. Other macros are set up to give you European accented letters.

To use a macro hold down  and press the letter key, hold down  and  for the capital letters.

The table below shows all the ready made macros.

a	ä	m	μ	s	ß	E	Æ
c	ç	n	ñ	t	time	N	Ñ
d	date	o	ö	u	ü	O	Ö
e	æ	p	¶	A	Ä	S	ß
h	1/2	q	1/4	C	Ç	U	Ü

You can easily re-use any of these  key combinations by recording a new macro.







The complete space set aside to hold the macros you define is 256 characters. All your macros combined cannot be larger than this. While recording a macro, you exceed this then the macro recording will terminate.

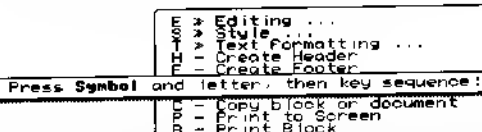
How to record a Macro "Phrase"

- 1 With a document on the screen press the  key.






Word Menu
E Editing ...
S Style ...
F Text Formatting ...
C Create Header
C Create Footer
M Macro Record start/end
D Display Macros
C Copy block on document
P Print to Screen
B Print Block

- 2 Select **Macro Record start/end** by using the     keys to highlight the option then pressing  or by pressing .










Word Menu
E Editing ...
S Style ...
F Text Formatting ...
C Create Header
C Create Footer
M Macro Record start/end
D Display Macros
C Copy block on document
P Print to Screen
B Print Block

Press Symbol and letter, then key sequence:

- 3 Hold down  (or  and ) then press a letter key. You are returned to the document. (While you are recording the macro an R shows on the top right hand corner of the screen.)
- 4 Type in the phrase you want to store. (In this example we are storing "Yours sincerely").



Yours sincerely

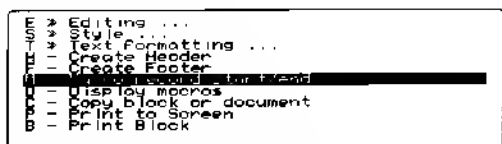
- 5 When you have finished typing the phrase press  and select **Macro record start/end** again by using the     keys to highlight the option then pressing  or by pressing . If you make a mistake while recording a macro then start again.

How to record a Macro "Command"

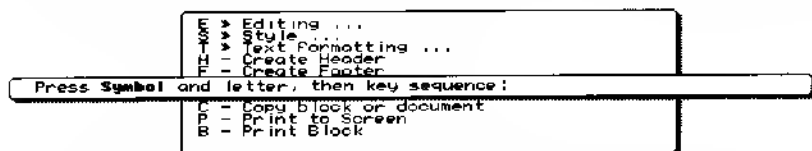
2000 10/10/2000

In this example we are storing the command to change to large print size under the **Symbol** [L 3] macro. A "Special Character" can be stored in the same way.

- 1 With a document on the screen press the **Symbol** key.



- 2 Select **Macro Record start/end** by using the **Word** **Calc** **Draw** **Spells** keys to highlight the option then pressing [Enter] or by pressing **M 0**:



- 3 Hold down **Symbol** press [L 3]. You are returned to the document. (While you are recording the macro an R shows on the top right hand corner of the screen.)
- 4 Now carry out the command or procedure you want to store.

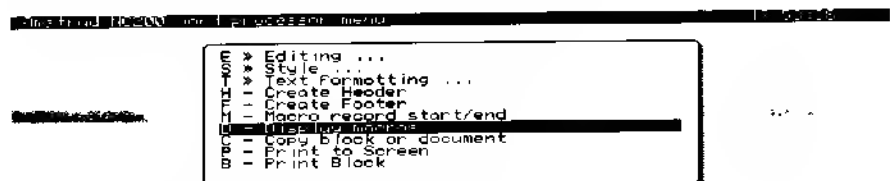
For this example press the **Symbol** key, select the **S >>Style** menu by pressing **S**, then select **L - enLarged** by pressing [L 3]. You are returned to the document and the enlarged print code shows on the screen:

- 5 Press **Symbol** then press **M 0** to stop recording. You are returned to the document and the macro is stored. If you make a mistake while recording a macro then start again.

To insert the enlarged code into any document you can now hold down **Symbol** and press [L 3].

Displaying the Stored Macros

A list of all your stored macros is displayed on the screen if you select "Display macros" at the Editing Menu:



You may not understand some of the macros listed, refer to Appendix 3 for further details.

Spell Checking


Your Notebook word processor comes with a 48,000 word dictionary and you can add words to it that you regularly use. The spell checker compares each word in your document against those in the dictionary, when it finds a word that is not in the dictionary it highlights the word and a menu shows on screen with various options allowing you to store the word in the dictionary, ignore it, change the word yourself (edit) or select a word from the dictionary. You can also spell check a single word.

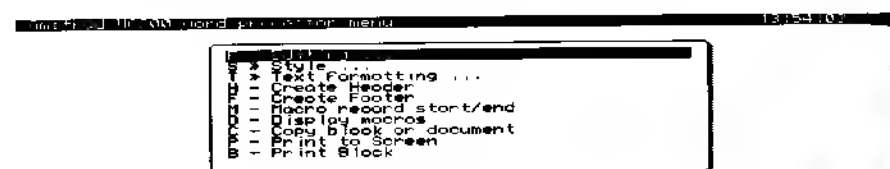
For instructions on how to use the spellchecker (Spell ward and Spell text) refer to Section 1 of this manual.

User Dictionary Upkeep

Each word you "Store" when using the spell checker is stored in your User Dictionary. You can "view" the words stored and delete words that you mis-spelt or no longer need.

View the words in the User Dictionary

- 1 While a document is on the screen press the  key:



2 Select the Editing menu by pressing [E].

W 300

```

C - Choose character (Sym-Menu)
G - Goto line/page/column (Ctrl-G)
C - Count words in block
C - Clear markers (Ctrl-K)
U - Undelete block (Ctrl-U)
W - View the User Dictionary
R - Remove word from user dictionary
D - Date (Sym-D)
T - Time (Sym-T)

```

3 Press [V] to select V -View User Dictionary.

The words on the screen cannot be changed or removed and pressing any key will return you to your document.

Remove a word from the User Dictionary

Only words that you have stored can be removed.

While a document is on the screen press [F10].

2 Press [F] or [J] to select the E >> Editing Menu.

3 Press [R] to select R - Remove word from user dictionary.

Type word to delete from the user dictionary and press ↵

4 Type the word then press [↵]; the word is removed and you are returned to the document.

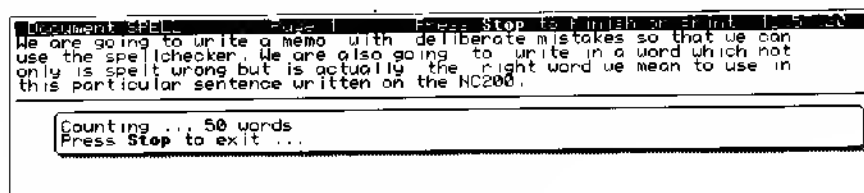
The word must be typed exactly as it is stored, if you type it differently you will see the message:

Type word to delete from the user dictionary and press ↵ Blenkinsop
Not in user dictionary. Press a key:

If this happens "View the User Dictionary" to see how you spelt the word originally, then try again to remove it.)

Counting Words

Your Notebook will count all the words in your document, just hold down **Function** and press **=**



Configuring the Word Processor

Change the default word processing settings using this menu. If for example, you prefer always to see the codes on screen change the "Show Printer Codes" setting to (Yes). When you want to switch them off temporarily use the "Codes on/off" (**Function** **F2**) from within the document.

To use the Configure menu hold down the YELLOW **Function** key and press **F5**:

EDITING OPTIONS Overtyping or **+ +** to change, **↑ ↓** to move, **Stop** to Finish

Insert on/off	(On)	On
Word wrap	(On)	On
Right justify	(On)	On
Decimal character	(.)	
Key repeat startup delay (100th secs)	(50)	50
Key repeat period (100th secs)	(5)	5
Cursor flash period (100th secs)	(50)	50
Show printer codes?	(No)	No
Show spaces?	(No)	No
Show tabs and returns?	(No)	No
Show status information?	(No)	No
Show ruler	(No)	No

To change one of the settings use **Down** to select the option then use **Left** **Right** to change the setting.

The first three entries define whether or not Insert, Word Wrap or Justification are normally on when you first start to edit a document. When you first start to use the Notebook they are all set to on. If you switch them off here you can easily switch the effects back on while typing a document using **Function** **F2**, **Function** **W** or **Function** **J** respectively.

Decimal character

This defines the character that will be used to align numbers when decimal tabs are used. In the UK this would normally be set to a full stop but it can be changed to a comma for use on the continent.

Key Repeat Startup delay

The time delay before a character starts to repeat when a key is held down can be changed. You may want to change this if, for example, you are not a trained typist and you often unintentionally repeat characters, however it will also cause a delay when you want to hold down a key, as when typing a line of hyphens or full stops. Increase the value to give a longer delay, decrease it to shorten the delay.











Key Repeat

The speed at which the character is repeated on screen as you hold down the key can be increased or decreased to suit your needs. To slow down increase the value, to speed up decrease the value.

Cursor Flash Period

Change the flash speed of the cursor, to slow down increase the value, to speed up decrease the value.

View options

The last five entries define which of those items is shown when you first start to edit a document. During editing, any of them can be switched on or off using  followed by  for codes,  for spaces,  for tabs & returns,  for status or  for ruler. (As shown on the inlay,   can also be used to show/hide status information and   can be used show/hide codes)

Printing from the Word Processor

Most printers will be able to print your Notebook document although they may not be able to print all the various styles (bold or italic for example) that are available in the word processor.

Connect to the Printer

Connect your Notebook to the printer using a parallel centronix printer lead (or a serial lead if the printer is serial). Most printers will already have this type of lead connected, so just connect it to the PARALLEL or SERIAL port on the back of your Notebook.

Please note that it is not possible to use the printer mechanism supplied with the Amstrad PCW wordprocessing computer. The only exception to this is the model supplied with a Canon BJ10 printer; this can be directly connected to the Notebook.

Switch on the Notebook and the printer.

The printer must be switched on and be "on-line"; if you are not familiar with the printer you are using refer to the manual supplied with the printer.

Select the Document you are going to print





Hold down YELLOW [function] and press [P x], your list of documents shown on the screen. Highlight the name of the document you want to print by using [Left] [Right] [Down] [Up].

Before you press [Enter] to start printing you should set up the Notebook for your printer using the Printing options menu.

Press the [Print] key, the following menu will show on screen:

PRINT MENU Overtyping or + + to change, ↑ ↓ to move, Stop to Finish

Start at page number	(1)	1
End at page number	(999)	999
Near letter quality / Draft	(NLQ)	NLQ
Continuous printing?	(Yes)	Yes
New page after print?	(Yes)	Yes
Form Feeds enabled?	(Yes)	Yes
Line Feeds printed?	(Yes)	Yes
Printer	(Simple)	Simple
Printer character set	(IBM)	IBM
Printer port	(Parallel)	Parallel
Serial port - Baud rate	(9600)	9600
Serial port - Data/stop bits	(8/1)	8/1
Serial port - Parity	(None)	None
Serial port - Handshake	(On)	On

Press  or  to move down the menu. Use  or  to change an option.

The **Start at / End at** options allow you to select just a range of pages to be printed. On dot-matrix printers the **NLQ** option determines if the printout is in a single, low resolution or a double, high resolution pass. Whether this option has any effect may depend on the printer you are using. Set **Continuous** to **No** if printing single sheets in a printer that does not auto-feed. When **Form feeds** are enabled the Notebook will send the special new page character to a printer (ASCII 12) for each new page, otherwise it pads out with blank lines. **Line feeds** should be disabled if your printer puts a blank line between every line printed.

Select one of the printer types:

Simple - This option will allow you to print on any printer but styles such as italic will not be printed, just straightforward text; underlining and bold might print but this will depend on the type of printer.

IBM 24 pin - Whatever the make and model of your printer, if it is compatible with the IBM 24 pin Printers (check the manual supplied with the printer - you may have to adjust the printer in some way) you can use this setting.

Epson 9 pin - Whatever the make and model of your printer if it is compatible with the Epson FX range (refer to the manual supplied with the printer) you can use this setting.

Epson 24 pin - If your printer is compatible with the Epson LQ range you can use this setting (refer to your printer's manual).

Canon BJ - Use this if you are using a Canon Bubblejet printer.

Laserjet - If your printer is an HP Laserjet, or compatible with one, use this setting. For other laser printers use the Epson 24 pin setting - the printer can emulate it.

Printer Character Set

There are two different sets of characters that a printer may use. The Epson set has a limited range of characters but offers italics, while the IBM set has the complete range of characters that your notebook understands but may prevent italics from being used. Most printers have DIP switches to change between the possible

choices. You should make sure that this setting on the Notebook agrees with the way the printer is set up.

Printer Port

This may be set to either parallel or serial. You should set this according to which port you have connected the printer to. If you have a choice always choose parallel (Centronics) as it is much easier to use and is also quicker. If you select serial then you must also set the values associated with the serial port.



Serial Port

These settings are for connection via the serial port, for printing to take place the printer and the Notebook must be set to the same values. These settings are similar to those used in the serial terminal. See the section on transferring documents for more detail.


The settings in your Notebook are the best settings to use, if you can adjust your printer to these settings do so (refer to the manual supplied with the printer).

(If using the parallel port you don't need to adjust these settings.)

Starting to Print

When you have finished setting up the printer press  to leave the menu. Return to the print document screen, and with the highlight on the document you want to print press .

If you see the message **Plug in or switch on the printer...** even though you have done so, check that paper is loaded and that it is switched "on-line".

The **Finished printing** message may appear almost immediately even though the printer has just started, this is because the whole document has been stored in the printer's buffer memory. You can press  to exit and continue working.

If you have printing problems

If the document does not print properly it is probably because you have not set-up the Notebook and/or printer correctly. Try setting the Notebook to a different type of printer using the Printer Options menu, you may find the correct setting using the "trial and error" method but, if all else fails, you can use the **Simple** setting.

Sending/Receiving files

The floppy disk drive on the Notebook is probably the easiest way of transferring documents and worksheets to and from another computer. Just copy a file to a disk, insert it into the other computer and you can then read in the information. However, some computers do not use the same type or format of disks as used on the Notebook and IBM PCs. In this case you can still transfer data to and from the other computer by linking it to the Notebook with a suitable cable and using the Notebook's Serial Terminal program to establish contact and send/receive documents. The terminal program can also be used to control a modem connected to the Notebook, but note that it does not provide facilities for auto dialling, off line reading, etc.

Because the word processor built into your Notebook is a development of the "Protex" word processor produced by Arnor, you may like to use the Notebook for entering documents on the move and then transfer them across to a desktop computer which also can run Protex to work on them in more detail when you return to the office. There are versions of the Protex software to run on all well known types of computer (IBM PC compatibles, Amstrad PCW, Commodore Amiga, Atari ST, Acorn Archimedes) They are available from:

Arnor Ltd
611 Lincoln Road
Peterborough
PE1 3HA

Tel: 0733 68909
Fax: 0733 67299

Even though you don't use Protex on your desktop computer you may still want to transfer documents from the Notebook to use in a different word processor. In this case you can still transfer the documents, choosing to convert them to WordStar format which is a format readable by many different word processing programs. If the word processor you intend to use cannot use WordStar format you can use plain ASCII but all formatting and layout will be lost.

You can transfer documents in the other direction (from desktop to the Notebook) as well. You would do this when you want to retrieve a previously saved document or when you want to

continue working on a document at home that you had started in the office. If you use the Protext word processor on the desktop machine then you can transfer documents to the Notebook before you go home, work on them in the evening or over weekends and then transfer them back to the desktop in the office and all the layout and text effects will be retained.

The spreadsheet software built into the Notebook is a development of "The Cracker" spreadsheet which is available in versions for IBM PC compatibles and CP/M based machines such as the Amstrad PCW range of computers. If you use The Cracker on one of those machines, worksheets (.MEM files) can be transferred directly from the Notebook to the other computer with all formatting and formulae intact. If you use some other spreadsheet software you can still export the data from your worksheets in .DIF, .DAT or .TXT files. However, the formulae will not be retained.

Note: The following tends to refer just to PC computers but what is said will apply equally as well to any other type of computer.

Serial or Parallel transfers ?

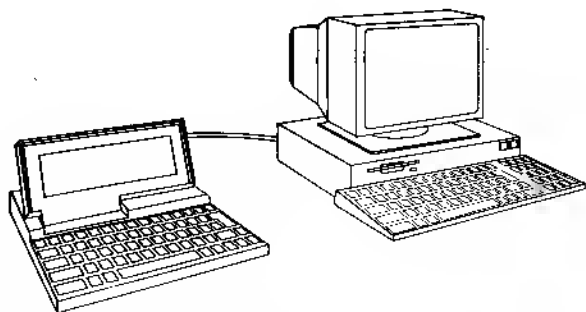
The Notebook can transfer documents either through its serial port using Xmodem/CRC or no protocol file transfers. Alternatively it can use the parallel port. Using the serial port you will just need a cable and some communication software for the PC or other computer that you are trying to connect to.

If you want to use the parallel port you must use the "Lapcat" software and cable that is available from Arnar at the above address. The advantage of using parallel transfers is two fold. Firstly you don't have any problems getting the right cable and making the right software settings and secondly, it is a faster method of transferring documents. Instructions on how to perform Lapcat transfer are given in the manual accompanying the Lapcat cable and software.

Serial transfers

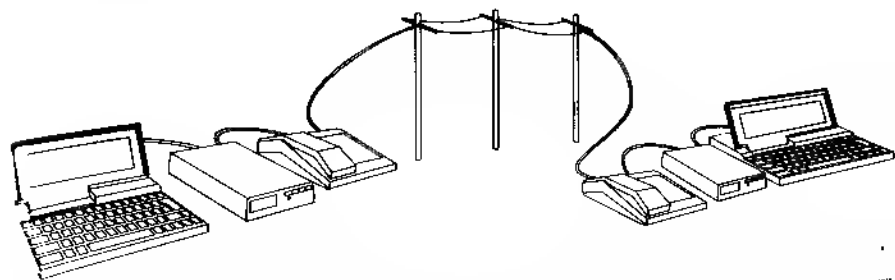
Before you can transfer documents to and from the Notebook you must physically connect it to the other computer. There are two ways in which you might do this:

"Local" connection



If the other computer is located in the same room as the Notebook then it will only be necessary to use a simple ("Null modem") cable to connect the two machines together. When you do this you connect the serial ports of the two computers together. The serial port on your Notebook is the 9 pin D shaped connector on the back of the machine. The actual connection for a serial port on another computer may vary from machine to machine. IBM PC compatible machines normally have either a 9 pin connector the same as the Notebook or they may have a 25 pin connector.

"Remote" connection



If the other computer is some distance away then you will need to make use of a device called a Modem that allows computers to send information over the telephone. Both the distant computer

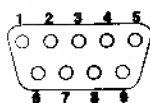
and the Notebook must have a modem attached to their serial ports. This second option is effectively the same as a local connection except that the Notebook is connected to a modem using a "straight through" cable in which "Transmit" (Tx) connects to "Transmit" and "Receive" (Rx) connects to "Receive" and so on.

When you use the serial terminal program in the Notebook you will be able to type commands to the modem. If it is a Hayes compatible modem you would normally use the command ATD<number> in order to telephone the other computer that you wish to connect to. Once connection is established you can proceed to send and receive documents in a similar fashion to that described below for a local connection.

Technical note: One point you may find useful to know is that if you leave the serial terminal program, the Notebook's serial port is switched off to conserve battery life. If you are connected to another computer via a modem the connection will almost certainly be lost when you do this. To prevent this happening you must instruct the modem to ignore the state of its DTR line. On some modems the command AT&D0 will instruct the modem to ignore this signal. Other modems have a switch setting that will achieve the same effect. If you cannot control the modems DTR signal then you must not leave the serial terminal program if you wish the connection to be maintained.

The Cable to use

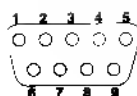
The Notebook's serial port has a 9 pin, male, D-type connector wired as follows:



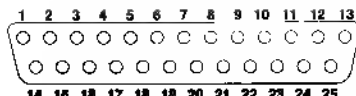
RS232 connector
looking into the
back of NC200

Pin	Signal	Abbreviation	Direction	
1	Not connected			
2	Receive data	RX	In	
3	Transmit data	TX	Out	
4	Data terminal ready	DTR	Out	Note: DTR just duplicates RTS
5	Ground	GND		
6	Not connected			
7	Request to send	RTS	Out	
8	Clear to send	CTS	In	
9	Not connected			

The computer you are trying to connect to will probably have either a 9 pin or 25 pin, male, D-type connector. Assuming it is wired the same as an IBM compatible PC computer, the connections will be as follows:



RS232 connector
looking into the
back of a PC (9 pin)



RS232 connector
looking into the
back of a PC (25 pin)

Signal	Abbreviation	Direction	Pin N° on 9 pin	pin N° on 25 pin
Ground	GND		5	7
Transmit data	TX	Out	3	2
Receive data	RX	In	2	3
Request to send	RTS	Out	7	4
Clear to send	CTS	In	8	5
Data set ready	DSR	In	6	8
Data terminal ready	DTR	Out	4	20
Ring indicator	RI	In	9	22
Frame ground				1

As you can see, both the Notebook and the other computer (if it has a nine pin connector) have their transmit data signal on pin 3 and their receive data signal on pin 2. You cannot just connect the similar named signals because transmit would connect to transmit and receive to receive. The transmit from one end must be connected to the receive line at the other and vice versa. Some of the other signals must be crossed over in a similar way.

A cable that crosses over the various signals in this way is often called a **Null Modem Cable**. The correct wiring for cables to connect the Notebook to an IBM PC compatible are:

9 pin to 9 pin Null Modem Cable

NC200		Other Computer	NC200	Other
RX 2	—	2 RX	2	to 3
TX 3	—	3 TX	3	to 2
DTR 4	—	5 GND	4	to 6
GND 5	—	6 DSR	5	to 5
RTS 7	—	7 RTS	7	to 8
CTS 8	—	8 CTS	8	to 7

9 pin to 25 pin Null Modem Cable

NC200		Other Computer	NC200	Other
RX 2	—	2 TX	2	to 2
TX 3	—	3 RX	3	to 3
DTR 4	—	4 RTS	4	to 6
GND 5	—	5 CTS	5	to 7
RTS 7	—	6 DSR	7	to 5
CTS 8	—	7 GND	8	to 4

If you are not able to buy a cable that is specifically designed for connecting the Notebook to other computers, you should be able to show these details to any cable manufacturer advertising in the

computing press and you will find that they will easily be able to make up the right cable for you.

Making the software connect

Once you have plugged the correctly wired cable into both the Notebook and the other computer you are trying to connect to, you are ready to try and see if the two will communicate. The Notebook already has the necessary software to do this built-in.

On the other machine you will need to use some communications software. The software you use will depend on the type of computer but, for example, if you are using a PC compatible that has a copy of Windows 3.x then you already have the necessary software. There is a program called Terminal included in Windows that will do. The communications software you use can be very simple indeed although it would be best if it supports Xmodem file transfers. The PC shareware program "Telix" is highly recommended.

The Notebook's Serial Terminal program


All communications with another computer will usually be performed from within the Notebook's Serial terminal program (the other transfer functions in the List Stored Document menu are for use by the Lapcat cable and software that is available from Arnor). The terminal program emulates a DEC VT52 terminal. Details of the escape codes it generates/recognises are given in Appendix 4.

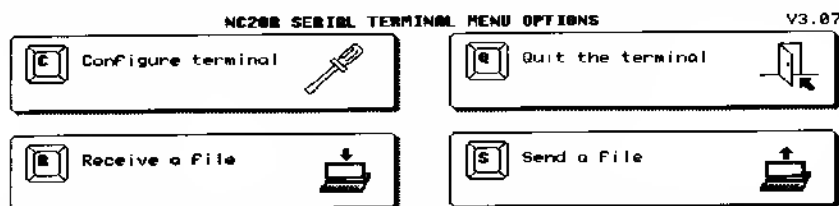
You start the Serial terminal program by pressing **Function** **S**. On doing this you will see the following screen:





NC200
Notebook
Serial Terminal Program


Press **MENU** For Terminal Options
Press **↵** to start the terminal now

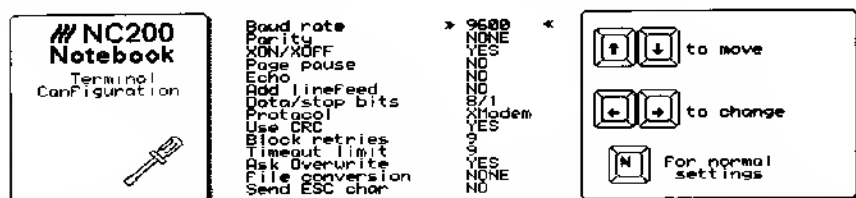
If you already had everything set up correctly, from when you last used the terminal program, you could just press **↵** to immediately start communication with the other computer. But when you first use the Serial program you will almost certainly need to set certain values correctly before starting.

When you are using the Terminal program you will find that the  key brings up a screen that is used for both setting various features related to the serial port and also for sending and receiving files:



You can quit the terminal from this screen by pressing . While actually in terminal mode you can normally press  to leave the terminal but if you have changed the **Send ESC char** option (detailed below) then it is not possible to use the  key to get out of the serial terminal program because that key will just produce an ESC character. You must press  to leave.

From this menu you press  to configure the options within the terminal program.



Without getting into long discussions about serial connections (which can be a very complicated subject) it is only really necessary for you to know that there are certain values associated with the serial port that must be set correctly before you can get two computers to communicate. Both ends should be set to the same values.

The **Baud rate** is just a measure of the speed at which the computers communicate. It can be set to a value chosen from 300, 1200, 2400, 4800, 9600, 19200. For a direct connection it is probably best just to try it at 19200 and only reduce it if there appears to be a problem or the other end cannot operate at that speed. You may find that the software used on the other computer limits you to a top speed of 9600 baud. This is the default setting.

The other things that can be set that affect the serial port are the number of **Data/stop bits** and the **Parity**. It isn't important to know

what these things are - just to ensure that both computers are set to the same values. Data bits should normally be set to 8, with 1 stop bit. This is shown as 8/1. The Parity should normally be set to NONE. The Notebook allows you to change these things if the software of the other end does not present a suitable choice, but almost all terminal software does allow these things to be changed and almost all will choose 9600, 8 data, No parity, 1 Stop bit as the default setting anyway. If you try to use a particularly old/slow modem you may find it useful to set 2 stop bits rather than just 1.

The **XON/XOFF** option selects whether or not the XON/XOFF software handshake protocol is used. This is a system by which one end can tell the other end to stop transmitting for a short while if it is sending data too fast. Try setting this option to "Yes" if characters are being lost. However, it does rely on the other end also understanding Xon/Xoff.

The **Page Pause** would normally be set to Yes when you are receiving screenfuls of data from the other end while using the terminal and it is scrolling off the screen too quickly to read. With Page pause on it will stop after every 16 lines and wait for a key press.

The **Echo** option determines whether the characters you type are shown on the Notebook's screen as well as being transmitted to the other computer. If the other end does not echo back the characters that you type you won't be able to see what you are typing. In this case you should switch echo on.

The **Add linefeed** option determines whether an extra line feed is performed for every carriage return received. Also, when this option is set to Yes the $\boxed{\text{↵}}$ key will generate both CR and LF codes instead of just the normal CR code. If lines are not broken where they should be then turn this option on. If, on the other hand, lines are double spaced, make sure this option is set to Off.

The **Protocol** option lets you choose between Xmodem and no protocol. When sending and receiving files you should always use Xmodem if you can. This is a system whereby the data to be sent is split into small packets and the other end confirms that each was received correctly. This means that you can be certain that no errors are introduced during the transfer process. This is explained in more detail later in this section.

The only reason to set the protocol to "None" is if the software on the other computer does not support Xmodem file transfers. When Xmodem is not used the data is just sent as one single block and the other end must capture the complete block of information and write it to a file. However, this can be prone to errors.

The **Use CRC** setting should always be set to Yes. This is the type of error checking used during the Xmodem file transfer. The other possibility is "Checksum" but this is an older method. Only change this setting if you know that the other end only supports Xmodem/Checksum.

The **Block retries** option sets the number of times an attempt is made to send an Xmodem packet before the transfer stops with an error.

The **Timeout limit** option sets the length of time in seconds that the Xmodem transfer will wait for the other end to respond to a request before assuming an error has occurred.

Ask Overwrite determines whether the serial terminal should stop and ask you if you really want to over write a file if the name you give for receiving already exists.

The **File conversion** option determines whether the data that is sent from the Notebook should be left in Protext format including all of the special codes for use in a copy of Protext on another computer (this is available from Arnor for PC/PCW/Amiga/ST/Archimedes). If you are exporting the data for use in any other word processor you should set this option to either WS (for WordStar) or ASCII. The merits of each of these file conversions was discussed in the section "Using the floppy disk drive".

If you change the options in the configuration menu and want to get them back to their initial starting values just press the **F₁₀** key for the Normal settings.

Making sure the connection works

Once you have the machines connected and they are both running terminal software you should find that if you type characters on the Notebook keyboard they appear on the screen of the other computer and vice versa. Each time you intend to transfer files to/from the Notebook it would be advisable to start by entering the Notebook's Serial Terminal program (**Function** **F₅**) and

just type a few characters on each keyboard to make sure that transmit and receive are working OK. There is no point in spending a long time trying to transfer files only to find that the fundamental connection that allows characters to be sent in both directions was not working.

Once you have established a sound connection between the two machines you should then be able to transfer files between the two. If you find that typing on one machine does cause something to appear on the other but the characters are just meaningless rubbish then it is probably because one of the baud rate, data bits, stop bits or parity settings are not correctly matched.

Note: The RS232 (Serial) port on the NC 200 uses signals at a higher levels than normally used inside the Notebook. This means that the batteries will drain at a faster rate than normal when making serial transfers. It may be an idea to run the Notebook from the mains adaptor when transferring files.

Choosing the correct transfer method

The Notebook can use two different types of file transfer. There is a very simple form where no protocol is used and a more powerful, versatile and reliable method called Xmodem. We suggest you always use Xmodem file transfer whenever possible. Xmodem file transfer breaks up the information to be sent into small pockets and sends each with some extra information that the receiving end can use to make sure that no faults were introduced.

Document transfers without Xmodem

The simplest form of file/document transfer is with "Protocol" set to None. This is provided so that people who cannot find software to support Xmodem transfer can still connect their Notebook to other computers. When you ask the Notebook to send a document without using Xmodem it just sends each character from the document you choose as if you were typing them directly in the serial terminal itself. On the computer that is receiving the file you just have to switch its ASCII capture on before starting to send the file. Once the Notebook has finished sending the file you can switch the capture off on the PC and the information that has been sent will be written to a file.

When transferring files from a PC to the Notebook using no protocol you start the receipt of the document on the Notebook. Initially it waits for the first character to be transmitted (you can always press if you didn't want to transfer a file). As soon as it has received the first character it then allows a maximum of 2 seconds for each subsequent character to be received. If a longer delay is encountered then the Notebook assumes that the other end has finished transmission. Stopping transfers in this way means that there is no need for End of File characters to be sent.

The length of time it waits for the initial character to be sent is the timeout period set in the Transfer settings. Normally this would be 9 seconds so you need to be ready to start the transmission of information from the PC before selecting the receive function.



To send a file, from the Notebook to a PC, without using Xmodem:



Make sure the serial terminal configure menu has the **Protocol** option set to **None**.

If the file is for use in Protext on the PC, make sure **File conversion** is set to **None**. If the file is not for Protext, set it to either **WS** or **ASCII**. WS will convert Protext codes to their WordStar equivalent. ASCII will strip out all special codes.



Establish the connection. Type a few characters on each keyboard and make sure they appear on the screen at the other computer.

- Make sure the receiving end is ready to receive the file. This will usually involve giving some sort of command to initiate an ASCII capture or "download". Because the Notebook can have longer filenames than on PCs (and use a bigger range of characters) you may have to change the name you give the file to be received at the PC end.





- In the Notebook's terminal program press the  key followed by  to select the **Send a file** option.

- Position the cursor over the document to send. If there are more documents in your Notebook than can be shown on the screen use the  and  keys to move to the others from the first or last column. If **Document sizes/date display** is set to **Shown**

In the System Settings menu then you may see ADDRESS BOOK and DIARY FILE in this list.

- 7 With the cursor over the document that you wish to send press  and the transmission process will begin. The counters on screen give an idea of how much information has been and will be sent. The "blocks" mentioned here are blocks of 128 characters each.
- 8 If you have asked for conversion to ASCII or WordStar you will see a reminder on screen that the conversion process is active and the actual number of blocks sent will probably be less than the initial estimate as some characters are removed during the conversion process
- 9 Once the Notebook has sent the document it will return to the normal terminal screen. Press  to send more files or to quit.
- 10 At the receiving end stop the file transfer. In some software this may be as easy as just pressing the Esc key, while in others you may have to give a command or select a menu entry to do this.

**To receive a file, Into the Notebook from a PC,
without using Xmodem transfer:**

- 1 Make sure the serial terminal configure menu has the **Protocol** option set to **None**.
- 2 Establish the connection. Type a few characters on each keyboard and make sure they appear on the screen of the other computer.
- 2 At the PC, select the function that will send the file as just straight ASCII text. This might be called something like "ASCII Send" or "ASCII Upload".
- 3 You will probably then be given the opportunity to select the file to send. Type its name but do not press  yet.
- 4 On the Notebook press the  key to select the serial terminal menu and then press  to receive a file.
- 5 If you want to receive a backup copy of a file that already exists position the cursor over the file of that name and press . If,

however, if it is a new file then position the cursor over the special (New file) entry and press .

If you selected (New file) you will then be asked to give a name for the document that is about to be received. You could just type the same name as used on the PC (8 characters, a full stop, then 3 characters).

If you select a file name that already exists and have the **Ask overwrite** option set to **Yes**, you will be asked to confirm that you wish to overwrite the existing file. Press

Once the Notebook has started the receive function you have 9 seconds (or whatever the timeout value was set to) to start transmission of the file (document) from the PC. Just press






Once the file has been received (there was a delay of longer than two seconds between characters) you are returned to the terminal screen.

Xmodem file transfers

You should always choose to use Xmodem file transfers in preference to the no protocol option. Xmodem is a far more reliable method to use and is supported by virtually every piece of communication software you might find on other computers.

There are actually two types of Xmodem protocol - Xmodem/CRC where a "Cyclic Redundancy Check" is used to check for errors and an older method known as Xmodem/Checksum. The latter is used on some older pieces of software. You can use the Configure terminal menu to specifically choose between CRC or Checksum. However, it is best to leave this setting on YES which selects CRC as one of the features of the CRC protocol is that if it cannot start communication within ten seconds using CRC it will automatically switch over to the Checksum method anyway. In the Configure terminal menu you can also set options to choose how many times a block is retried before the transfer is aborted and how many seconds the program waits before assuming that an error has occurred.

To send a file, from the Notebook to a PC, using the Xmodem protocol

- 1 Make sure that the serial terminal Configure menu has the **Protocol** option set to **Xmodem** and the **Use CRC** setting should be set appropriately.
- 2 If the file is for use in Protext on the PC, make sure **File conversion** is set to **None**. If the file is not for Protext, set it to either **WS** or **ASCII**. WS will convert Protext codes to their WordStar equivalent. ASCII will strip out all special codes.
- 3 Establish the connection. Type a few characters on each keyboard and make sure they appear on the screen of the other computer.
- 4 On the Notebook while in the serial terminal press  followed by  to select the send a file function.
- 5 Position the cursor over the document to send. If there are more documents in your Notebook than can be shown on the screen use the  and  keys to move to the others from the first or last column. If **Document sizes/date display** is set to **Shown** in the System Settings menu then you may see ADDRESS BOOK and DIARY FILE in this list.
- 6 With the cursor over the document that you wish to send press  and the transmission process will begin. Notice that, unlike the no protocol send, you actually start transmitting the file before giving the instructions to receive it at the other computer.
- 7 Once you have started the send operation you must instruct the other end to start receiving it. This will depend on the software you use but you may find it called "Xmodem download". You will be asked to give a filename that the information will be stored in on that computer.
- 8 Once you start the Xmodem receive on the other computer the information will be transferred. You will see a counter on the Notebook showing you how many blocks of 128 characters it has sent.
- 9 If you have asked for conversion to ASCII or WordStar you will see a reminder on screen that the conversion process is active

and the actual number of blocks sent will probably be less than the initial estimate as some characters are removed during the conversion process

- Once the Notebook has finished sending the file it will revert to the serial terminal screen. At the PC end it will automatically finish the transfer and write the data into the file whose name you gave earlier.

Note that when the Notebook sends information using the Xmodem protocol the number of characters sent is often a number larger than the actual number of characters in the document. The reason for this is that Xmodem always rounds up the number of characters to send to a multiple of 128.

It is possible to perform the transfer by starting the PC receiving before the Notebook starts sending but there will be a few second delay while the two machines synchronise.

To receive a file, into the Notebook from a PC, using the Xmodem protocol:

Make sure that the serial terminal Configure menu has the **Protocol** option set to **Xmodem** and the **Use CRC** setting should be set appropriately.

Establish the connection. Type a few characters on each keyboard and make sure they appear on the screen of the other computer.

On the Notebook while in the serial terminal press **Receive Menu** followed by **R** to select the receive a file function.

- If you want to receive a backup copy of a file that already exists position the cursor over the file of that name. If, however, it is a new file then position the cursor over the special **(New file)** entry. Do not press **Enter** yet - you should start the transmission from the PC before the Notebook starts to receive. Note, it would be unwise to try and receive a file as an address book or diary file that wasn't originally sent as one from the Notebook.
- At the PC end give the command to the software to start sending the chosen file. This may be called something like "Xmodem upload" or "Xmodem Send".

- 6 Once the PC has started to send the file press ☐ on the Notebook to start receiving the file.
- 7 If you selected (New file) you will then be asked to give a name for the document that is about to be received. You could just type the same name as used on the PC (8 characters, a full stop, then 3 characters).
- 8 If you select a file name that already exists and have the **Ask overwrite** option set to **Yes**, you will be asked to confirm that you wish to overwrite the existing file. Press ☐ if this is what you want.
- 9 When the transfer is complete the Notebook will return to the normal serial terminal screen.


Word Processor Stored Commands

When typing documents, any line that starts with the right angle bracket character (>) in column one is not just stored as another line of text in your document. Instead, it is interpreted as a special command to the word processor. These commands are called "stored commands" because they are stored away in each document that they are used in but are not printed.

Apart from rulers, the angle bracket is always followed by a two letter code that identifies the command. These command names are chosen to try and help you remember them so, for example, HE is Header and FO is Footer.


You may not realise this but you may already be familiar with "stored commands". If you have changed the layout of your text using a different ruler, or if you have added headers or footers from the menu option (which just insert an >HE or >FO stored command) then you have already used stored commands.

There are two types of stored command, those that are acted upon immediately and those that only have any effect when the document is printed.

An example of an immediate stored command is >PA. This is the Page break command and forces the next line that is typed to start on a new page. Normally, when you type, if you haven't changed the default settings, you will find that you can type 60 lines before the line that marks the end of a page appears. However, if you start a new line with >PA and then press  you will find that the current page is finished and the cursor starts at the top of a new page after the page break bar.

An example of a stored command that is only acted upon when the document is printed is the >PO (Print Odd pages) command. This tells the word processor to only print the odd pages of your document and is useful if you want to print on both sides of some paper to produce a book or magazine. You print the odd pages on one side of the paper and then turn it over and run it through the printer again printing the even pages on the other side (using the >PE command). Because it is only acted on at print time, entering >PO on a new line has no obvious effect while you are still writing a document in the word processor.



Because stored commands are acted upon, rather than forming part of your document, the word processor does not count any line that starts with an angle bracket when it is calculating where one page ends and the next begins. Also, even if you have got bold, italic or underline showing on screen, lines starting with ">" are not affected by these things.

If you start a line with the angle bracket character the word processor checks to see if it is an immediate command that it should act upon when you press . If it recognises it as such then the correct action is taken and the line is also stored in the document. Otherwise it just enters the line into the document and no further action is taken at this time. When you subsequently come to print the document a second check is made for any stored commands. If, at this time a line is found that starts with an angle bracket but the two letters that follow are not a recognised command then it will stop printing and display the message:

>??

Unknown stored command

Press Stop to exit ...

A number of the stored commands just provide another way of setting the same options as found in some of the menus. When a stored command is used it over-rides the setting in a menu. For example, if you have set a page length of 66 in the Layout menu   and then include a >PL 35 command in your document, the word processor will assume a page length of 35 not 66.

There are 60 stored commands that the word processor recognises. They generally fall into one of five categories.

There are those that are used for defining the page **layout** - setting the various margins, length of page, etc.

A collection of the commands are used for page **formatting** - adding header and footer text to each page when a document is printed, controlling the printing of odd/even pages, etc.

There are also commands that affect the operation of the **printer**. Allowing printer control codes to be sent directly to the printer and affecting whether micro spacing is used for example.

There are some **miscellaneous** commands. For example, you can use a stored command to add comments to your documents to

describe the contents for your own future reference but this will not print.

Perhaps the most powerful, but also the most difficult to understand stored commands are those that are used for **mail merge**. Mail merge is the name given to the process where you have a standard letter that is printed several times inserting a different name in certain places each time it is printed. If you have ever received a letter saying "Dear Mr *your name*, you could win £100,000. All you have to do Mr. *your name* is ..." then you have received a mail merged letter.

The following is an alphabetic list of all the stored commands with a short description of their function. This should be used when you just want a quick reminder of the command to use. Following this is a more detailed description of each command in sections divided as described above.

The list may look a bit daunting at first but do bear in mind that a lot of the commands are used for the complex subject of mail merge. You don't need worry about these unless you actually intend to use the feature.

Command	Name	Type	Immediate
AV	Ask for Variable	Mail merge	No
BM	Bottom Margin	Layout	Yes
CE	CEntre	Formatting	No
CF	Close File	Mail merge	No
CO	COmment	Miscellaneous	Yes
CP	Continuous Printing	Formatting	No
CS	Clear Screen	Miscellaneous	No
CW	define Character Width	Printer	No
DF	Define data File	Mail merge	No
DM	Display Message	Miscellaneous	No
EA	End printing At page	Formatting	No
EF	Even page Footer	Formatting	No
EH	Even page Header	Formatting	No
EI	End If	Mail merge	No
EL	Eise	Mail merge	No
EM	Even side Margin	Layout	No
EP	Even Page throw	Formatting	Yes
FF	Form Feed codes	Formatting	No
FM	Footer Margin	Layout	Yes

FO	Faoter	Farmatting	No
FP	Format whilst Printing	Formatting	Na
HE	Header	Formatting	Na
HM	Header Margin	Layout	Yes
ID	If Detined	Mail merge	No
IE	If Exhausted	Mail merge	Na
IF	If	Mail merge	No
IN	Insert	Miscelloneous	No
IU	If Undefined	Mail merge	No
LS	Line Spacing	Formatting	Yes
MC	Microspace Code	Printer	No
MS	MicroSpocing	Printer	No
NC	Number of Copies	Formatting	No
NP	New Page offer print	Formatting	No
OC	Output Code to printer	Printer	No
OF	Odd page Footer	Formatting	No
OH	Odd page Header	Formatting	No
OM	Odd side Margin	Layout	No
OP	Odd Page throw	Formatting	Yes
PA	PAGE throw	Formatting	Yes
PE	Print Even pages	Formatting	No
PL	Page Length	Loyout	Yes
PN	Page Number	Formatting	Yes
PO	Print Odd pages	Formattling	No
PP	Proportional Printing	Printer	No
RJ	Right Justification	Formatting	Na
RP	RePeat	Mail merge	No
RU	Read variable Unconditional	Mail merge	No
RV	Read Variable	Mail merge	No
SA	Start At page	Formatting	No
SK	SKip	Mail merge	No
SM	Side Morgin	Layout	No
ST	STop printing	Miscellaneous	No
SV	Set Variable	Mail merge	No
TM	Top Margin	Layout	Yes
UN	UNtil	Mail merge	No
WC	Write file Close	Mail merge	No
WF	Write File	Mail merge	No
WM	Write Message	Mail merge	No
WT	Wait and display	Miscellaneous	No
ZM	Zero Margins	Layout	Yes

The following pages contain a more detailed description of each command listed above. The commands are grouped together according to the type of the command. Beneath the name of each command is a line described as "Syntax:". This shows exactly how you use the command in a document. For example, the syntax of the Page Length (PL) command is shown as:

Syntax: >PL *number*

The word *number* in italics means that whenever you use the PL command it should be followed by a number (not just the word "number"). In this case the number you give is the number of lines per page that you would like to use. To help you understand the syntax of the command, most descriptions include at least one example. An example of the PL command might be:

>PL 70

which tells the word processor that the paper you are going to print on has 70 lines.

Page Layout commands

Most of these commands duplicate the function of items in the layout menu that is accessed by pressing **Function** and **F7** while editing a document. Those layout menu entries apply to the current document and all subsequent documents that you write until you change the settings. The stored commands can be used to over-ride the settings for just one special document (for example, if you want to quickly print some labels but leave the **Function** **F7** settings at their normal values).

BM Bottom Margin

Syntax: >BM *number*

The BM command is used to specify a value for the bottom margin which is the number of blank lines left at the bottom of each page after all the text (and possibly footer) have been printed. If you used the command:

>BM 3

the word processor would know that it must not print on the last three lines of the page. The reason you specify a bottom margin is because most printers cannot print right to the bottom of a page.

The printer usually loses grip on the piece of paper about 3 lines from the end of the page. Some laser printers are able to print right down to the very last line of a piece of paper but even there it is usually better to leave a margin at the bottom of the page as it looks more professional. If no BM command is used a value of 3 is assumed.

EM Even side Margin

Syntax: >EM *number*

The Even side margin command is followed by a number which tells the word processor how many characters from the left edge of the page it should start printing the even numbered pages in your document. You may notice that there is a SM command available which defines the Side Margin for every page. The EM and OM commands allow different side margins to be defined for left and right pages while the SM command applies to all pages. You would use the SM command when every page of your document is identical (for example a memo or a letter). However, if you were writing a book it is usual for the right hand, odd numbered, pages to have a larger side margin than the left pages. This is because the book is bound together at the left hand edge of the right pages. If you were writing a book you might include the following two lines at the top of the document:

```
>EM 8  
>OM 12
```

This would mean that printing on the even numbered, left hand pages would start 8 characters in from the edge of the paper while the printing of the odd numbered left hand pages would start at 12 characters in from the edge. This would allow an extra 4 character margin on the right hand pages to allow for the book binding. A value of 5 is assumed if no actual >EM command is used.

FM Footer Margin

Syntax: >FM *number*

The FM command is followed by a number which defines how many lines at the bottom of a page should be reserved for printing the footer text in. This area is positioned after the main body of text on the page but before the bottom margin (the area which cannot be printed on -see the BM command). The Footer Margin area is only used if footers are defined using the FO, EF or OF commands.

the value used if no FM command is used is 2 if footers are enabled, otherwise it is zero.

-M Header Margin

Syntax: >HM *number*

The HM command is similar to the FM command except that it is used to specify the number of lines below the top margin (see TM command) but above the main page body that are reserved for printing the header text in. If no header is defined then a value of zero is used for HM otherwise it will assume the value 2. An example HM command might be:

FM 3

This would reserve three lines at the top of the page (below the top margin) where header text would be printed.

OM Odd side Margin

Syntax: >OM *number*

The OM command is very similar to the EM command but acts on odd pages rather than even pages. For a description and example see the EM command. If no OM command is used then a default value of 5 is used.

PL Page Length

Syntax: >PL *number*

The PL command is used to tell the word processor how long the paper you are going to print on is. Most printers print six lines to the inch so by measuring a piece of paper you can work out how many lines long it will be. A4 paper is 70 lines long. Continuous, 11" paper is 66 lines long. A 1.5" label is 9 lines long and a 2" label is 12 lines long.

The word processor takes the value you give for page length and subtracts from this the value of top and bottom margins (BM and FM commands). These are the areas that cannot be printed on because the printer cannot hold the stationery. If headers and footers are being used then the word processor further subtracts the FM and HM values. The amount left is the number of lines in the main body of the page that you can enter text on.

When printing on continuous stationery such as fan fold 11" paper labels the top and bottom margins may be set to zero and if no

headers and footers are used then the number of lines that the word processor will allow you to enter on each page is the same as the page length. Another way of putting this is to say that the actual number of lines that can be used on a page are:

PL - TM - BM (- HM if headers on) (- FM if footers on)

An example of the PL command might be:

>PL 9

This would tell the word processor that there were only 9 lines to each page (1.5" labels).

SM Side Margin

Syntax: **>SM *number***

The SM command is followed by a number that tells the word processor how many characters from the left hand edge of the page it should start printing at. The SM command applies to all pages in a document. If you want to have different values for odd and even pages then you should use the EM and OM commands instead. If you do not give an SM command then a value of 5 is used.

TM Top Margin

Syntax: **>TM *number***

The Top Margin is the number of lines at the top of a page where the word processor will not attempt to print. The reason for defining a top margin is that most printers cannot fully grip a piece of paper until it has been fed a few lines into the printer. Most printers will not be able to print on at least the top 3 lines of a page. However, if you use continuous paper (with holes up the edge) then the printer can print on every line so you could set TM to zero. However, documents look more professional if a few lines are left blank at the top and bottom of a page. If no TM command is given a value of 3 is assumed. If you were to use the command:

>TM 6


The word processor would leave 6 lines blank at the top of each page.

ZM Zero Margins

Syntax: >ZM



This command sets all margins to be zero. This can be useful if you are using continuous paper and want to print a draft copy of a document without having it correctly spaced out on each page.

Page Formatting commands

Several of these stored commands achieve the same effect as settings in some of the menus. For example, CP, EA, SA achieve similar effects to the settings in the menu you see when you press the  key at the print document screen. The stored commands only take effect for the document in which they appear while the menu entries apply to all documents until the settings are changed.

CE Centre

Syntax: >CE *text*

The CE command is followed by text on the same line which will be centred when the document is printed. You may wonder why you would wish to leave centring until the document is printed when you can always achieve the effect using  . Well, the main use is for when you are also using proportional printing and the positioning to centre the text will be dependent on the actual width of the characters used. Another use for CE is when the text that is to be centred is of variable length. This will occur when using mail merge and the text to be centred contains a mail merge variable. For example:

>CE Memorandum to &name&

might print as:


Memorandum to Mr. Sugar

CP Continuous Printing

Syntax: >CP ON

or: >CP OFF

The CP command is always followed by the word ON or OFF and switches continuous printing on or off. When Continuous printing is on the word processor assumes that your printer is loaded with continuous (fan fold) paper that has tractor holes up the edges. It then sends every page of the document to be printed at once

without a break. When CP is switched to Off, the word processor assumes you are printing on separate, single sheets of paper so it pauses before each page is printed and allows you to load single sheets into the printer. Once the paper is in place and the printer is switched on-line you press the Space Bar to print the next page. If you print to a laser printer or other printer that has a sheet feeder you will probably want to tell the word processor that it is using continuous paper by using the CP ON command. The CP command has the same effect as the "Continuous printing?" switch in the print menu (accessed by pressing  at the print document screen)

EA End printing At page

Syntax: >EA *number*

This command tells the word processor the number of the last page you want printed. Normally it will print every page up to the last page in the document. The EA command may be used together with the SA command which defines which page to start printing at. For example, say you have a 10 page document and include the commands:

>SA 3

>EA 7

at the top of the document then, when it is printed, only pages 3 to 7 will be printed. It is also possible to select a range of pages to print using the settings in the print menu but they apply to all documents while the stored commands only apply to the document in which they are used.

EF Even page Footer

Syntax: >EF *text*

The EF command is used to define a line of text that will be printed within the footer margin area of every even page of a document. The simplest form of commands for putting in footers is the FO command which applies to every page. However, the EF and OF commands allow different footers to be applied to even and odd pages. This would be useful, for example, if you were writing a book and wanted to put the page number at the right hand end on the foot of every right (odd) page and the page number at the left on the foot of every left (even) page. An example of the EF command might be:

which would result in every even page having the page number on the left and the odd pages having the page number on the right. The "%" symbol has a special meaning in headers and footers. Instead of just printing the symbol it is filled in with the current page number as it is printed.

Once a footer has been defined the word processor will start to reserve the footer margin area for printing the footer in. Before then it would assume the footer margin were zero.

EH Even page Header

Syntax: >EH text

The EH command is very similar to the EF command except that it defines the header for every even page rather than the footer. Just like the EF command, once the EH command has been given the word processor will start to reserve the header margin area for printing the header text in. An example of the EH command might be to put the title of a book on the top of every left hand page. At the same time you might want to put the chapter title at the top of every right hand (odd) page:

EH Fly Fishing by J R Hartley

OF

Tying flies

EP Even Page throw

Syntax: >EP

or: >EP number

The EP command is like the PA command that forces a new page to be started. However, the EP command has a further function in that it will always arrange for the next page to be an even numbered page.

If the current page has an odd number it will just end it at the point the EP command is included and the next page will be the next even numbered page. However, if the current page were even numbered then, not only would it be ended, a whole, blank, odd numbered page would be inserted so that text would continue on the next even numbered page. This forces the next line to start on the top of a left hand (even numbered) page.

If the EP command is followed by a number then the EP command will only have any effect if the number of blank lines remaining on the current page is less than or equal to the given number. So, for example, the command:

>EP 10

will force the next line to start at the top of an even numbered page if there are 10 or less lines remaining on the current page.

FF Form Feed codes

Syntax: **>FF ON**

or: **>FF OFF**

The FF command is always followed by the word ON or OFF. It tells the word processor whether or not you would like it to send a form feed character at the end of every page that is printed. The form feed character (number 12) is a special character used by some printers to tell them to finish printing the current page and move to the start of the next page. It may be necessary with some laser printers to switch the FF command ON so that each page is followed by a character 12. If no FF command is used it is switched Off and no form feed characters are sent. After the command:

>FF ON

the word processor will send a form feed character at the end of each page. This has the same effect as the "Form feeds enabled?" setting in the print menu.

FO Footer

Syntax: **>FO text**

or: **>FO OFF**

or: **>FO ON**

The FO command is used to tell the word processor what text you would like to have printed on the foot of every page. Once an FO command is used the footer margin area will be reserved for printing the footer text in and the footer will be printed on the bottom line of the footer margin area.

Once a footer has been defined it will appear at the foot of every page printed. However, you can disable footers on any pages you choose by using the >FO command followed by the word OFF. Any subsequent pages will not have a footer printed. If, later in the

document, the command >FO ON is used the printing of footers will be resumed.

• you just use the command >FO ON without having previously defined a footer then a centralised page number will be printed in the foot of every page.

• you want to include page numbers within a footer just put a "%" sign where you would like the number to be printed. It will be filled with the correct value when the document is printed. If you want to include the "%" character in a footer use "%%" to print a single percent symbol.

>FP Format whilst Printing

Syntax: >FP ON
or: >FP OFF

The FP command is followed by the word ON or OFF and specifies whether the document should be reformatted while it is being printed. If no FP command is used then it is assumed to be OFF. The command is used in conjunction with the RJ command. The RJ command switches right justification on or off in the section of document following it. If you have sections of the document where it is switched on and others where it is switched off then you should use the FP ON command to ensure that the justified sections are properly formatted prior to printing.

>HE Header

Syntax: >HE *text*
or: >HE ON
or: >HE OFF

The HE command is used in exactly the same way as the FO command except that it defines and controls the printing of a header text in the header margin area at the top of each page. See the description of FO for more details.

>LS Line Spacing

Syntax: >LS *number*

The LS command defines the line spacing to be used when a document is printed. It has no effect on what you see on screen while editing. Normally line spacing is set to one so that lines are printed as you see them while editing. However, for manuscripts and scientific reports it is often necessary to have the lines double

spaced when printed and this can be achieved with the command:

>LS 2

The LS command will also accept half line feed values that end in .5 (1.5, 2.5, etc.). But only some printers will be able to space text in half line spacing values. The LS command has the same function as the "Line spacing" setting in the Layout menu that is accessed by pressing $\left[\frac{\text{Shift}}{\text{F7}} \right]$ while holding down $\left[\text{Control} \right]$ when typing a document.

NC Number of Copies

Syntax: **>NC number**

This command specifies how many copies of the document should be printed. If no NC command is used the value of one is assumed. A command such as:

>NC 3

would result in three copies of a document being printed.

NP New Page after print

Syntax: **>NP ON**

or: **>NP OFF**

The NP command is used to switch on or off the printing of a blank page after a whole document has been printed. If no NP command is used the feature is switched OFF. The NP command is particularly useful when printing on continuous, fan-fold, paper as it moves the printer to the top of the next blank page after a document has been printed. This allows the document that has just been printed to be ripped off at the next line of perforations. The NP command has the same effect as the "New page after print?" setting in the print document menu.

OF Odd page Footer

Syntax: **>OF text**

For a full description see the EF command. The OF command works in just the same way as the Even page Footer command except that it defines the footer text for Odd (right hand) pages. A typical OF command might be:

>OF This is printed at the foot of all odd pages

OH Odd page Header

Syntax: >OH *text*

The OH command is similar to the EH command except that it defines the header to be used on odd numbered, right hand, pages.

OP Odd Page throw

Syntax: >OP



or: >OP *number*

The Odd Page throw command will cause the next line printed to start at the top of an odd page. If the current page is even numbered it will be at the start of the very next page. If the current page is already odd numbered then a blank, even numbered, page will be inserted so that the next line is at the start of an odd page. This would often be used when writing a book when you want to ensure that each chapter starts on a right hand page. If the OP command is followed by a number it will only take effect if the current page has that number (or fewer) blank lines remaining.

PA Page throw

Syntax: >PA

or: >PA *number*

The PAGE throw command will cause the current page to be ended and the next line of text will start printing at the top of the next page. If the PA command is followed by a number then it will only take effect if that number of blank lines or fewer remain on the current page. You can quickly insert a PA command into a document by pressing the  key while holding down .

PE Print Even pages

Syntax: >PE ON

or: >PE OFF

The Print Even pages command, PE, when followed by the word ON will cause only the even pages of the current document to be printed. If the command >PE OFF is used then all pages will be printed.

The reason for only printing even pages is so that a book or magazine can be printed on both sides of some sheets of paper. First the odd pages are printed. Then the paper is turned over and the even pages are printed on the other side of the same paper.

PN Page Number

Syntax: >PN *number*

The number following the PN command sets the number that the current page will have, subsequent pages will be renumbered accordingly. For example, if the command:

>PN 10

is used on a page then that page will be page 10 and the following page will be 11 and so on. The PN command is useful when writing separate chapters of a book and you want to ensure that the next chapter's page numbering continues on after the last page of the previous chapter. Page numbers can be made to appear on the printed pages by including the % symbol in either a header or footer definition.

PO Print Odd pages

Syntax: >PO ON

or: >PO OFF


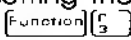
When the PO ON command is used only the odd pages of a document will be printed. Using the command PO OFF will return things to normal so that all pages are printed.

As described under the PE command. The PE and PO commands are used together to first print the odd and then the even pages of a document on either side of the paper to be printed.

RJ Right Justification

Syntax: >RJ ON

or: >RJ OFF

The RJ command can be used to switch on or off the right justification of text in specific areas of a document. The lines following an RJ ON command will be justified while those following an RJ OFF command will have a ragged right margin. For this command to operate correctly the document should be reformatted during printing. This is accomplished by using the FP ON command. The setting of right justification for a whole document can be switched on or off using  or setting the option in the configure menu that is accessed by pressing  while editing.

SA Start At page

Syntax: >SA *number*

The SA command is used to define which page number printing should start at. Together with the EA command this allows only specified sections of a document to be printed. See the description of EA for more details.

Printer commands

CW define Character Width

Syntax: >CW *number*

This command is used to set the character width for micro spacing. Possible examples are as follows though these are not necessarily correct for all printers.:

>CW 10 (elite characters)
>CW 7 (condensed)
>CW 14 (condensed enlarged)

MC Micro space Code

Syntax: >MC *code code...*

This command defines the sequence of codes that will move the print head by the smallest possible amount. The word processor uses this to evenly space the words in a line of justified text. A typical example use of the command might be:

>MC 27 "L" 1 0 0

Which will mean that every time the word processor wants to move the print head by the smallest possible amount it will send the above sequence. The actual sequence of codes used is dependent on the printer being used.

MS micro spacing

Syntax: >MS ON
or: >MS OFF

The MS command turns micro spacing on or off. When micro spacing is on the word processor will evenly distribute the extra space on each line that is justified. Normally it tries to distribute extra, whole, spaces along the line to perform the justification but

micro spacing allows it to properly divide the extra space between every word and leads to a more professional looking result.

However, the ability to use micro spacing is dependent on the printer that you use and it may be necessary to give the correct CW and MC commands before it can be used successfully. For some printers you only need an MS ON command but this all depends on which printer you choose in the second screen of the Print document menu.

OC Output Code to printer

Syntax: >OC code code...

The OC command is used to output codes to a printer. Normally, when you want to send special codes to a printer you just put a word in bold or italic or whatever and the word processor arranges to send the correct sequence of codes to the selected printer to achieve the effect. However, there may be other effects that a printer can produce by sending it codes. You can use the OC command to put such a sequence of codes in your document. For example, when using an Epson compatible printer:

>OC 27, "S", 1

will send the codes that switch it into subscript printing while


>OC 27, "T"

will cancel the effect. See your printer manual for a list of the control codes that it understands.

PP Proportional Printing

Syntax: >PP ON

or: >PP OFF

The PP command switches proportional printing on or off. Normally it is off if no PP command has been used. When PP is switched on the word processor no longer assumes that all characters are the same width when printed. Instead it will use its knowledge of the width of individual characters to produce a better justified appearance. For this to work the printer should be sent a code to switch it into a proportional font. This can be achieved by using the style menu "P - Proportional" entry to put the necessary code in your document. A quicker way of entering the code is to press 

followed by [P x]. Whether proportional printing works correctly may depend upon your printer.

Miscellaneous commands

CO Comment

Syntax: >CO *text*
or: >>> *text*

This command can be followed by any text so that it appears in the document but will not appear when printed. This can be used to add a descriptive reminder of the start of a document to remind you later what a document contains. It can also be used to include annotations. For example:

```
>CO This is chapters 2 and 3 of my book on quantum mechanics  
>CO Draft number 3 - 11th March 1992
```

Or,

```
>>> Must send memo to Mr. S about the csrrying case
```

CS Clear Screen

Syntax: >CS *message*

The CS command will be interpreted when you come to print a document. It will cause the screen to be cleared and then any text on the CS command line will be displayed on the screen. The CS command would normally be used when mail merging to clear the screen and display an explanatory message about the data that is being asked for by subsequent AV commands. The CS command could be used more generally to print on the screen a description of the document that is being printed. For example:

```
>CS Printing the second part of the stored command chapter
```

DM Display Message

Syntax: >DM *message*

The message on the line following DM is displayed on screen during printing. Several DM commands might be used after a CS command to display a multiple line message on screen during printing.

IN Insert

Syntax: >IN *document_name*

The Insert command is very powerful. For example, if you write a book (or even a single chapter) in several sections, each contained in a separate document you can produce a master document that just includes a number of >IN commands to print all the various bits together. For example:

```
>CS Printing the whole book
>IN "Stored cmds"
>IN "title page"
>IN "contents"
>IN "Chapter 1"
>IN "Chapter 2"
>IN "Appendix"
>IN "Index"
```

The advantage of printing a book in this way is that the page numbering, headers, footers and margins defined in the first document will apply through the book unless over-ruled by a subsequent stored command.

The IN command could also be used to build a document from standard paragraphs. You could keep each standard paragraph in a separate document and then build a final document by just using a few IN commands. For example:

Dear Mr Smith

```
>IN "thank you"
>IN "widget info"
>IN "contact us"
Yours sincerely,
```

Mr Bloggs

ST Stop

Syntax: >ST *message*

The ST command causes printing to stop as soon as it is encountered. If a message is included on the >ST command line then that will be displayed on the screen. The ST command would usually be used when using the conditional printing facility provided by mail merge commands.

WT Wait and display

Syntax: >WT *message*

The WT command causes printing to be stopped temporarily and any message included on the WT command line will be displayed on the screen. Printing will resume when any key is pressed. An example of this might be:

>WT Make sure printer is loaded with 1.5" labels...

This would be placed right at the start of a document. When the document was printed the message would be displayed allowing the user to put the right sort of paper into the printer before printing commences.

Mail merge commands

Mail merge is an extremely powerful feature of the word processor but unfortunately this inevitably leads to a certain amount of complication. The following is just a short description of each of the mail merge stored commands. Following this is a description of the basics of mail merging but in a book this size it is difficult to include every aspect of such a large subject.

AV Ask for Variable

Syntax: AV *string identifier number...*

This is used during mail merging and causes the word processor to stop while the document is being printed and ask for a value to be typed in which is then given to a variable.

The meaning of the various parts of the command syntax are: *string* is the prompt displayed on the screen, *identifier* is the name of a variable into which the entered value will be stored and *number* is the maximum length of the input that will be expected.

An example might be:

>AV "Enter today's date", date

or

>AV "Type an invoice number", invnum, 6

This command would stop and print the text in quotes and then wait for the user to type in a value. Only 6 characters would be allowed.

CF Close File

Syntax: >CF

This closes a document file that was previously opened by the WF command. The ability to write to a document is used when you want to capture what has been output from a mail merging session into a document as well as just printing it.

DF Define data File

Syntax: >DF *document_name*

File is just a boffin word for document. This command is used to tell the word processor which document it should use to read the data for a mail merge operation from. A typical file (document) might include a list of names and addresses which would be used to print multiple copies of the same letter to different people.

EI End If

Syntax: >EI

The EI command is used after a list of commands that will only be executed if the condition in a preceding IF command has been met. There are various forms of IF command - ID, IE, IF and IU. A typical conditional sequence might be:

>IF town = "York"

As a resident of York we think you may be particularly interested to hear of our weekly meeting held at York Minster.

>EI

EL Else

Syntax: >EL

The ELse command is used to end the section of commands and text to be included if an IF condition is met and to start a section of commands and text that will be used if the IF condition was not met. It would finally be terminated with an EI command. For example:

```
>IF telno = ""
```

As you haven't got a telephone please contact us by post.

```
>EL
```

Please call us as soon as possible on 0708 123456

```
>EI
```

ID If Defined

Syntax: >ID *identifier*

A check is made to see if the variable *identifier* has been defined. Only if it has will the following section up to the next >EL or >EI command be used.

IE If Exhausted

Syntax: >IE

When mail merging data is read from a data file document and is used to fill in the various mail merge variables. Several similar letters may be printed in this way but it may be useful at the end of the print run to perform some other action. This can be achieved using the IE command. The block of text and commands following an IE command up to the next EL or EI will only be performed if the data file is exhausted. Say, for example, that for each letter that was printed you had a variable called "count" recording the number printed. At the end you could include the following:

```
>IE
```

```
>CS Mail merge finished. &count& copies printed.
```

```
>EI
```

IF If

Syntax: >IF *condition*

If the *condition* given in the IF command is met then the subsequent block of text and commands up to the next EL or EI is used. This is an extremely powerful command and allows many different kinds of conditions to be tested for. See the more detailed description of it in the chapter on Mail Merge below.

IU If Undefined

Syntax: >IU *identifier*

This tests to see if the variable *identifier* is defined. Only if it is undefined will the following block of text and commands up to the next EL or EI be used.

RP Repeat

Syntax: >RP

The RP command is used to start a block of text and commands that will be used repeatedly. The end of the block is marked by a UN command which also sets a condition that must be met for the repetition to cease. The following very simple example will print the numbers 1 to 10:

```
>SV count=1
>RP
&count&
>SV count=count + 1
>UN count > 10
```

RU Read variable Unconditional

Syntax: >RU *identifier, identifier...*

The RU command will read data from the data file document that has been identified by the DF command and assign the data it reads to each identifier listed. The RU command reads unconditionally so that it is normally used with data files where every entry has the same number of fields. An example might be:

```
>RU name, address1, address2, address3, dummy
```

RV Read Variable

Syntax: >RV *identifier identifier...*

The RV command is used to read values from the data file and assign them to the list of variables. RV reads from the data file until it finds an empty field. It then stops reading and assigns a null value to any unfilled variables named on the RV command line.

SK Skip

Syntax: >SK *condition*

If the given condition is true then the printing of the current document is terminated. You could for example read a long data file but only print out letters to people whose name was Smith using

```
>RV name, addr1, addr2, addr3
>SK name <> "Smith"
```

....

The "<>" means "not equal".

SV Set Variable

Syntax: >SV *identifier* = *expression*

The SV command is used to set a variable, *identifier* to be equal to the result of an expression. The expression is formed using the arithmetic operators +, -, /, *. (/ means divide and * means multiply).

The expression is evaluated in the order that the items in the calculation are encountered. It is not possible to change the precedence of expressions as parentheses cannot be used. If a variable name appears in an expression its contents will be used if it is numeric. Complex expressions can be formed by the use of temporary variables to hold the intermediate result.

```
>SV temp = value1 + value2 + value3
```

```
>SV average = temp / 3
```

The above achieves the same effect as the expression:

```
average = (value1 + value2 + value3) / 3
```

UN Until

Syntax: >UN *condition*

The UN command is used at the end of a block started with the RP (Repeat) command. All the text and commands between RP and UN will be used repeatedly until the *condition* in the UN command becomes true.

WC Write file Close

Syntax: >WC

The WC command closes a write file that has been opened by the WF command.

WF Write File

Syntax: >WF *document*

or: >WF ON

or: >WF OFF

The WF command is used to open a file (*document*) that will have messages written to it. This allows the output of a mail merge run to be written to a file as well as being printed. The WF command used with either ON or OFF to start or stop the writing of data to a file. A very simple example might be:

>WF "Write test"

>WF ON

This is a line of text that will be written to "Write Test"

>WF OFF

This line will be printed on the printer.

>WF ON

This is the second line written to the file.

>WC

If you print this document it will create a new document called "Write test" containing two lines of text. The middle line will only be printed on the printer.

WM Write Message

Syntax: >WM *message*

This command is used to write messages to the document file that has been opened using the WF command. The WM command will still write to a file even if the WF OFF command has been used.

Mail merge

Mail merge is, without doubt, the most powerful feature of the word processor built into your Notebook. In its simplest form it will allow you to make a simple template letter and then print multiple copies with different people's name and addresses on each. This is useful for printing things such as club newsletters.

The actual range of mail merge commands available is quite large and, in effect, forms the basis of a very simple programming language. For example, type the following lines into a new document and then Stop editing and print it. (Don't worry if you don't understand what the commands mean yet)

```
>CS This "program" prints the 7 times table
>WT Hit any key to start...
>SV count = 1
>RP
>SV result = count * 7
>SV result = result[w1]
>SV count = count[w1]
>DM &count& * 7 = &result&
>SV count = count + 1
>UN count = 13
```

That gives you just a taste of what can be achieved with mail merge but let's start at the very beginning and try to understand exactly what mail merge is.

Simple mail merging

In its simplest form mail merge is just the process of taking a document (or file) full of data such as names and addresses and putting them into a main template letter. For example, suppose you have a document called "names" that contains the details of the members of your club in the following form (it might be an idea to type this in if you want to follow this chapter by trying the examples) Leave a blank line after each 5 line entry:

```
John Smith
17 Acscia Avenue
Surbiton
Surrey
ABC 1HW
```

Eric Viking
26 Pownell Road
Mucklethwaite
Lancashire
PO3 9BU

Norman Nobody
1 The Avenue
Dunmow
Essex
GH6 3TU

Supposing you want to send each of them a letter to tell them that their subscription to your club is now due. You could write each a separate letter filling in the relevant name and address where appropriate but it would be far easier to get the word processor to do this for you. Consider what the letter would look like if you were writing to John Smith:

15th August 1992

Dear John,

I write to remind you that your subscription is now due. Just to keep our records up to date please confirm your name and address details are as shown below:

John Smith
27 Acacia Avenue
Surbiton
Surrey
ABC 1HW

Yours sincerely,

Cliff Lawson

It is clear that if we want to turn this letter into a template to be used for everyone we must replace all specific references to John Smith with some sort of "place holder" which will be filled in with different details for each different copy of the letter printed. The letter might then become:

15th August 1992

Dear &name&,

I write to remind you that your subscription is now due. Just to keep our records up to date please can confirm your name and address details are as shown below:

&name&
&addr1&
&addr2&
&addr3&
&postcode&

Yours sincerely,

Cliff Lawson

The "&" is a special indicator to the word processor that the word contained within the "&" symbols is the name of a mail merge variable which it must fill in when it prints the letter.

So that is our template letter, which can be stored in a document called "template" - type it in now if you like. Now we have to have some means of telling the word processor which document contains the list of names and addresses. We do this by using a DF stored command in the template letter. Add the line:

>DF names





to the top of the document.

However, all the DF command does is tell the word processor where the data is being kept. It has no way of knowing that the names and addresses are organised so that there is a single line with the name, 3 with the address, one with the postcode and one blank line. We must also tell the word processor how to read the data from the data file and which mail merge variables the various items should be stored in. This is achieved using the RV command to read the information from the data file into mail merge variables which can then be inserted into the template letter. Add the following command after the DF command:

>RV name, addr1, addr2, saddr3, postcode, dummy

When this line is executed the word processor will read the first line from the data file and assign it to "name". The second line will go into "addr1" and so on. The reason for having an extra variable called "dummy" is that each address is followed by a blank line to

separate it from the next and so each time that blank line will be read into "dummy" but not used.

You could now try printing the document to a printer from the "Print document" screen. You should get three copies of the letter printed. Each will have a different name and address. While experimenting with mail merge it can be a waste of paper to repeatedly print to a printer. While editing the template you can see what the results of a mail merge will be by printing the document to the screen. Press  followed by . The document is shown 16 lines at a time. Press  to see each subsequent 15 lines. Press  to abandon printing a long document to the screen. You will see that where you have included mailmerge variables (&name&) they are filled in with the values from the data file.

More about reading data

There are two commands which can be used to read data from a data file and assign it to mail merge variables. RV is the simpler form of command. It just reads data and assigns it to the named variables until a blank line is read when it stops reading data and sets all the other "unread" variables to be blank. The problem with this is that if we had a shorter address such as:

Tom Brown
Rugby School
Rugby

RU3 8BY

The blank line would cause problems if the RV command were used.

When you print the letter you would get one in which Tom's address was used but his postcode would be missed out because the reading of the file would have finished at the blank line between Rugby and RU3 8BY. The next letter printed would have a name of "RU3 8BY"! This clearly is not what we wanted at all.

If the RV command is changed to RU, which will happily read an entry even if it is blank, then things are restored to normal. You will notice that although the names and addresses file contains a blank line between "Rugby" and "RU3 8BY", when printed this blank does not appear. This is because when a variable appears enclosed in

'&' characters. It does not print anything if the variable is blank. If you really wanted the blank line you could replace the "&" characters with "!" symbols. A variable name enclosed in "!" will print the contents of that variable even if it is blank.

In the data file it is probably safest to put a single dollar sign on any lines which form part of the data but would otherwise be blank (the line between Rugby and the postcode in this case). The word processor knows that a line with a single dollar character on should be read in as a blank line. Just use completely blank lines between each record (collection of data). In this case you would only have completely blank lines between the postcode of one entry and the next name.

Inputting data when printing

At the moment the template letter has the fixed date in it but we may want to use the same template several times and enter the date just before printing. This can be achieved by removing "15th August 1992" and replacing it with &date&.

Try that now and print the template letter. You will get a message saying "Unknown variable 'date'". We need the word processor to stop and ask for date to be typed in when the template is printed. This is achieved with the AV command which will Ask for a Variable to be typed in. Add a line at the top of the template document:

>AV "Type in today's date: ", date

When you now print the document you will find that there is just one slight problem with this - you are asked to type in the date for every copy of the letter that is printed. You only want to be asked once at the very start so add the following line before the AV command line:

>IU date

and add the line:

>EI

After the AV command line. This will mean that the AV command is only used if the variable "date" is undefined. (This is what IU means 'Undefined'). Once you have typed the date in it will be defined in subsequent prints of the letter.

Other ways to set variables

So far we have seen that it is possible to set the contents of a mail merge variable using either the RV/RU commands to read the value from a data file or the AV command to get the user to type in a value when the template is printed. It is also possible to set the contents of a variable directly using the SV command.

Suppose we want to keep a count of how many copies of the letter have been printed and show this at the end of printing. This could be achieved as follows. First, on the line after the AV command that asks for the date add:

```
>SV count = 1
```

This sets a variable called 'count' to be 1 on the first time the document is printed. We know this will only happen on the first occasion because we have already seen that the line within the IU and EI block is only used the once. This SV command shows another feature of the mail merge - variables can contain numbers as well as pieces of text and SV can be used to give a value to a variable (up to now we have only used name, addr1, and so on for storing pieces of text).

After each copy has been printed we must increase the value held in count by one. This is done by including the following command at the end of the document:

```
>SV count = count + 1
```

This means that count should be set to the current value of count plus one. The final thing we need is to arrange for a message to be printed on the screen once the last letter has been printed. We know when the last letter has been printed because the data file will be exhausted. We can test for this condition using the IE command. So, on the line above SV count = count + 1 add the following lines:

```
>IE  
>CS Number of copies printed was &count&  
>EI
```

The CS command will clear the screen and display the following message. The &count& part of the message will be filled in with the current value held in the count variable. When you print the

template, at the very end, you should see the message "Number of copies printed was 4.00". We don't really want the two decimal places to be included in the display of count. This can be achieved by including the following on the line above the CS command:

```
>SV count = count[w1]
```

Splitting data out from a variable

The **[w1]** is a special command to the word processor which means take only the first "word" contained in count. You might think it odd that we think of count as containing a word when really it holds a number. But the value 4.00 is thought of by the word processor as two words "4" and "00" separated by a full stop. The **[w1]** at the end of the line takes word 1 from count.

It is possible to split out words from a line of text in a similar way. For example, if the variable "text" was set using:

```
>SV text = "Now is the time for all good men"
```

text[w1] would be "Now",

text[w3] would be "the",

text[w-1] would be "men" (w-1 means the last word)

text[w4:7] would be "time for all good" (words 4 to 7)

text[w7:] would be "good men" (words 7 to the end)

You can also pick out a range of letters, for example text[2:8] would be "ow is t".

You can use this ability to pick out parts of a piece of text within a conditional statement. For example,

```
>IF name[w-1] = "Smith"
```

would only be true if the last word in *name* (the surname) was Smith.

In our example template we will currently get "Dear John Smith," printed. What we really want is just "Dear John,". You may already have guessed how we might achieve this. After the >RV command add the line:

```
>SV firstname = name[w1]
```

and then modify the line which says Dear &name&, to read:

```
Dear &firstname&,
```


The complete template should read:

```
>DF names
>RV name, addr1, addr2, addr3, postcode, dummy
>SV firstname = name[w1]
>IU date
>AV "Type in today's date : " date
>SV count = 1
>EI
```

&date&

Dear &firstname&,

I write to remind you that you subscription is now due.
Just to keep our records up to date please can confirm
your name and address details are as shown below:

&name&
&addr1&
&addr2&
&addr3&
&postcode&

Yours sincerely,

Cliff Lawson

```
>IE
>SV count = count[w1]
>CS Number of copies printed was &count&
>EI
>SV count = count + 1
```

Using the IF command

As has already been shown, you can arrange for selected pieces of text and selected stored commands to be used by including them in a conditional block that starts with one of the IF commands. You can use ID to test if a variable has been defined. IU will test if a variable is undefined. The commands and text following IE will only be used if the data file is exhausted. However, most conditional tests are made using the general IF command followed by a condition. If the condition is met then the following lines are used. There are various comparisons that can be used in an IF command, they are as follows:

Comparison	Meaning	Example
=	equal to	>IF name = "John"
<>	not equal to	>IF (total + 3) <> 5
<	less than	>IF count < 10
<=	less than or equal	>IF vot <= 17.5
>	Greater than	>IF oge > 18
>=	greater than or equal	>IF height > 5
IN	is contained in	>IF "Smi" IN name
NOTIN	Is not contained in	>IF "081" NOTIN num

The condition can include expressions similar to those that might be used in an SV command. For example:


```
>IF price + delivery + vat > 200
```

Adding variables

When the addition operator is used to add to variables together, the word processor checks to see if they are both numbers. If they are, then the addition is done numerically, otherwise one piece of text is just added onto the end of another. The following examples may illustrate this:

```
>SV name1="Cliff "
>SV name2="Lawson"
>SV num1="37"
>SV num2="53"
name1 + name2 = "Cliff Lawson"
name1 + num1 = "Cliff 37"
num1 + num2 = "90"
num2 + name2 = "53 Lawson"
```

Using names and addresses from the Address Book

As you may already have a list of names and addresses entered into the address book section of your Notebook you may be wondering if you can use them in the data file for a mail merge operation. The answer is yes but because they are stored in a special way within the address book you must extract them into a new document before they can be used. The way to do this is to start a new document (call it "Addresses" maybe). Hit  so that the "Start typing new text here" message also appears (this step is

absolutely vital!), then press **[Function] [F]** to switch to the address book function. Use the **[Word] [C] [F]** keys to browse through your addresses until you find the first one that you want to use for mail merging. Now press **[F]** to transfer that into your document. Repeat this process for each entry you want to add. Now make sure that each has the same number of lines and that there is a blank line after each. You may want to delete some of the lines from each one, for example, remove the line that has the fax number on. A quick way to delete a whole line in the word processor is to press **[Ctrl] [E]** while the cursor is on the line.

Mail merge without a data file

The above description of mail merge has shown the way it is used with two files, one full of names and addresses and the other a template letter with sections to be filled in. There is a second general use for the mail merge feature and this is to construct just a template which, when printed, asks you to input various pieces of information and just fills them in immediately before printing. The obvious example of this is printing invoices. The following shows an example of this:

```
>AV "Enter today's date : ", date
>AV "Enter current VAT rate % : ", vatrate
>AV "Type invoice number : ", invnum
>SV gnet=0 gvat=0 gtotinc=0
```

INVOICE

```
Invoice number: &invnum&                               Date: &date&
```

```
Description  Retail  Quant  Disc  Total  Net  VAT  TOTAL
```

```
>RP
>AV "Description of goods? " descrip 12
>AV "Retail price? " ret "Quantity?" quant
>AV "Discount % ?" disc
>IF disc=""
>SV disc = 0
>EI
>SV totret=ret * quant      off=totret/100*disc
>SV net=totret-off      vat=net*vatrate      vat=vat/100
>SV totinc=net+vat      gnet=gnet+net      gvat=gvat+vat
>SV gtotinc=gtotinc+totinc
```

```

>-----R
&descrip& &ret& &quant& &disc& &totret& &net& &vat& &totinc&
>AV "Another entry? Y/N ", yeno
>UN yeno[1]<>"Y"

```

```

-----
TOTALS &gnet& &gvat& &gtotinc&
-----

```

>ST

The first few lines just input some necessary information to be printed at the top of the invoice.

The variables **gnet**, **gvat** and **gtotinc** will be used to hold the global totals of nett price, amount of vat and total price including VAT. They are set to zero at the start.

The next few lines will actually be printed at the top of an invoice. Then everything between the RP and subsequent UN line are repeated for each line of the document until you enter something other than Yes to the "Another entry?" question.

For each line the mail merge program asks you to input a description, price, quantity and discount. A special check is made to see if ☐ was pressed when discount was asked for and, if so, the variable **disc** is set to zero. The next couple of lines do all the necessary calculations, adding VAT and reducing by any discount. The totals for this line are then added into the global totals.

The next line defines a ruler with decimal tabs so that all the numbers line up and the following line actually prints the information into the invoice.

BBC BASIC

Your Notebook contains a powerful BASIC interpreter that can be used to write your own programs. BASIC is the most popular programming language for beginners to learn. In fact, the name BASIC is short for Beginners All-purpose Symbolic Instruction Code because it is designed with beginners in mind. Symbolic Instruction Code is just a technical way of saying "programming language". The version of BASIC built into the Notebook is compatible with BBC BASIC - the version that is taught in most schools and that is used on many other computers.

When you are using the Notebook you can switch to using BASIC at any time by holding down the **Function** key and pressing **F8**. To leave BASIC when you have finished you type the command ***QUIT**. Programs are not saved automatically so you **MUST** use the **SAVE** command before leaving BASIC to preserve any program you have been working on.

You may like to set the 'Preserve context during power off' switch in the System Settings menu to 'Yes' so that if you switch off while using BASIC your program is still available when you next switch on.

When you are using BASIC you must ensure that Caps Lock is switched on at all times because BASIC expects all its commands to be entered in upper case. If you type in a command and just see the message "Mistake" then it may well be that you have mistakenly used lower case. To help you, each time you switch to BASIC Caps Lock will be turned on (if it wasn't already). When you leave BASIC the setting of Caps Lock will be returned to its original state.

When BASIC is started the screen will clear and you will see the message:

BBC BASIC (NC200) Version 3.12

(C) Copyright R.T.Russell 1992



>

The ">" symbol is the BASIC "prompt" and it shows that BASIC is ready for you to type in a command. There are two ways in which BASIC can be used. You can just type individual commands at the prompt and the result of them will be shown immediately.


Immediate commands

Try typing:

```
PRINT 3 + 4
```

When you press  the result, 7, is displayed immediately. This is known as immediate mode. Now, try typing the following (you must end every command by typing .




```
PRINT "Hello World"
```

To type "Hello World" you must switch Caps Lock off temporarily by pressing the  key, but remember to switch it back on before typing further BASIC commands)

PRINT is a command which does just what the name suggests and tells BASIC that when the line is executed it should print whatever follows the command on the line. If you just want some text printed you must put it in quotation marks. Anything that isn't in quotation marks BASIC assumes are further instructions. (As it did with 3 + 4, which it understood were instruction to tell it to add 3 and 4).

Writing programs - a short tutorial

Besides Immediate mode the other way in which BASIC is used is for you to type in the lines of a program and these will be stored in the Notebook's memory. This is known as program mode. It is only when you give the special command, **RUN**, that the commands you have entered are actually acted upon. BASIC knows to store a command rather than act on it immediately if it starts with a number. Each line you type in must have a different number and the lines will be stored in number order. So, for example, if you were to type:

```
10 PRINT "Start"   
30 PRINT "End"   
20 PRINT 3 + 4 
```

The lines would actually be stored in the order 10, 20, 30. You can see this by typing the Immediate mode command **LIST**. This will show you the program that is being held in the Notebook's memory.

You might wonder why the lines have been numbered 10, 20, 30 rather than just 1, 2 and 3. The reason for this is that if you later choose to add a line between 10 and 20 you could pick a number such as 15 that would be stored between them. If the lines were numbered 1, 2, 3 there would be no room to add a line between 1 and 2. You cannot use 1.5 as a line number. You can only use whole numbers. Try typing in:

```
15 PRINT "The result of 3 added to 4 is ";
```

and then type LIST to see how that new line has been slotted in between 10 and 20. The semi-colon on the end of line 15 is a special command to BASIC that means that the next thing it prints should appear on the same line as the preceding text.

So far, all that you have done is to enter the lines of a program. To actually see what happens when the program runs you must give the immediate command RUN. You will see the program print the following:

Start

```
The result of 3 added to 4 is      7
```

End

When you have finished writing a program you can store it permanently by using the **SAVE** command. You should type the word SAVE followed by the name of a file in which you want to store your BASIC program. The file name must be given in quotation marks. To save your first program you could type:

```
SAVE "FIRST"
```

To clear the memory so that you can start entering a completely new program you use the command **NEW**. Just type:

```
NEW
```

You must be careful with this command. If you type NEW without first saving anything you want to keep you will lose everything that you have entered. If you type the command LIST you will see that your first program has disappeared. BBC BASIC has a special command, **OLD**, which you can use immediately after a NEW command to recover what has just been erased. You must use OLD straight away, as soon as you enter a new program line the old program is lost forever.

To check that the little program that you just saved can be recovered, type the command:

LOAD "FIRST"

This will load the program back into BASIC's program memory. You can now type LIST and you will see that the program has been recovered. However, we no longer want to keep a copy of that program in BASIC's memory so type the NEW command to clear BASIC's memory then a new program can be entered. Now that BASIC is ready for a new program to be entered type in the following small program. Remember that BASIC keywords (such as PRINT, IF, THEN, GOTO) must be in upper case. If you forget you will see the error "Mistake in line x" when you RUN the program.

```
10 NUM = 1
20 PRINT NUM
30 NUM = NUM + 1
40 IF NUM < 8 THEN GOTO 20
```

Type RUN and you should see that the program prints out the numbers 1 to 7.

Line 10 sets a variable called NUM to a starting value of 1. A **variable** is the name you give to an item that will store either a number or a piece of text. In this case the item is storing the number for us and we have chosen to call it NUM.

Line 20 uses the PRINT command to show the contents of the variable NUM on the screen. Because NUM is not enclosed in quotation marks, BASIC knows that it must look up the value stored in a variable called NUM instead of just printing the word NUM on the screen.

Line 30 adds one onto the current value stored in NUM. In effect the line is saying "Set the variable called NUM to be equal to the value currently store in NUM with one added to it".


Line 40 checks to see if NUM is less than 8 (the left angle bracket is a special symbol used by BASIC to mean "less than"). If NUM still has a value less than 8 then BASIC goes on to execute the command GOTO 20 which means, go back to line 20 and carry on running the program from there. If NUM is 8 or more then the part of the line after THEN is ignored and it goes on to execute the next line in

sequence. Because there are no more lines after 40, the program stops running.

This simple 4 line program does not do very much but it has shown many of the concepts involved in programming. There is the use of variables to store information (NUM), there is the printing of results, there is the manipulation of variables to change the value that is held and there is the redirection of program flow depending on whether a certain condition is met. It is this last feature that sets a computer apart from a simple calculator. Calculators (however complex) can only perform arithmetic. It is only once the flow of calculation can be changed as the result of a previous operation that a calculating device can be considered a computer.

Anyone familiar with BASIC may have already realised that there is a much neater way of achieving exactly the same effect as that program we have just entered. Type NEW to start a new program and then enter the following 3 lines:

```
10 FOR num = 1 TO 7
20 PRINT num
30 NEXT num
```

To save you having to type in the numbers 10, 20, 30 you could type the immediate mode command **AUTO** and BASIC will generate the number in sequence for you starting at 10 and going up in steps of 10. When it shows "40" just press the  key to get back to the BASIC prompt ">".

Notice that this time we have put NUM in lower case "num". This just makes the program easier to read. We could just as easily have used NUM but the important thing to know is that BASIC treats variable names as case sensitive which means that it treats NUM and num (and Num and nUm and nuM and so on) as different variables. You must always make sure that variable names match correctly. It may be easiest to always use lower case for variable names and upper case for BASIC keywords. This makes your programs easier to read.

The words **FOR** and **NEXT** are 2 commands in BASIC that are always used together. The FOR command starts a variable at a certain value and sets an upper limit for it. Then every command in between the FOR and the NEXT command is executed and one is added to the variable. If it has not reached the limit a jump is made back to the instruction after the FOR command. The command

NEXT is followed by the same name of the variable as used in the FOR command so that any particular NEXT command knows which FOR command it should jump back to.


So far our little programs have had fixed numbers built into the program (the first program could only show the result of $3 + 4$, the second and third would just print the numbers 1 to 7 on the screen). Normally you will want to make your programs more versatile so that each time they are run they ask for some information and then modify the operation of the program according to the information entered. You do this with the **INPUT** command.

Type LIST to see the current three line program and then type:

```
5 INPUT "Start";start
7 INPUT "Finish";finish
10 FOR num = start TO finish
```

Now type LIST and you will see that not only have two new lines been added to the start of the program but line 10 has been replaced by a new version. If you type in a new line with the same number as an existing line then that existing line will be replaced by the new version.

The sequence of numbers in our program is now 5, 7, 10, 20, 30. This is a bit untidy. Type the command **RENUMBER** and then LIST. You will see that the program has been renumbered with the line numbers going up in steps of 10.

When you RUN the modified program it will stop and ask for a Start value. Type the number 10 and press . When it asks for "Finish" type 14. It will then print the numbers 10 to 14. If you run it again and enter different start and finish values it will print a different set of numbers each time.

The following is another example of a program that asks for you to input numbers when it is run and then processes the numbers to show a result.

```
10 INPUT "VAT rate as a percentage (0..100) "; vatrate
20 INPUT "Amount "; amount
30 total = amount + (amount * vatrate / 100)
40 PRINT amount " With VAT added is " total
```

When you RUN this program it will ask you to input the VAT Rate and then an amount. It will print out what that amount is when it has


had VAT added to it at the given rate. Like before, lines 10 and 20 use the INPUT command to get the user of the program to input some values. The wording of the question is enclosed in quotation marks and this is followed by a semicolon (;) and then the name of the variable in which the value should be stored. If you don't use a semicolon then no question mark is printed.

Line 30 creates a new variable called total which is the result of adding the amount multiplied by the VAT rate to the original amount. The part of the calculation in parentheses is calculated first before the final addition is performed. The asterisk (*) is the symbol BASIC understands to mean "multiply" and the slash (/) is the symbol that means "divide by".

Line 40 prints the original amount stored in the variable amount, followed by the message (in quotation marks) followed by the value of the variable total.

This program has one or two shortcomings. Firstly, it was not really necessary to create the intermediate variable called total to hold the result of the calculation. Instead, line 30 could be deleted and line 40 changed to read

```
40 PRINT amount "With VAT added is " amount + (amount * vatrate / 100)
```

To delete line 30 just type the number 30 on its own and press . This is the standard way to remove a single line from a program. If you run the program again it will work exactly as before even though it has been simplified.

The next problem that we could overcome is the fact that each time the program is RUN it just allows one set of numbers to be entered and then stops. What we could do with is having the program loop back to the start each time it gets to the end. This is easy to do. Just add line 50:

```
50 GOTO 10
```

When you type RUN it will ask you for the VAT rate and then the amount and then display the result. It will then go back round and ask for the VAT rate again. This isn't really what we wanted. It should only be necessary to enter the VAT rate once each time the program is run. What's more, there doesn't appear to be any way to stop the program running.

To stop the program press the **Stop** key. If you press the **Stop** key when a program is running it will stop running and the BASIC prompt will appear after a message which says "Escape at line x". This tells you which line BASIC was executing when you stopped it.

The easy answer to not being asked to input the VAT rate every time is to make the destination of the final jump to be line 20. So type the command:

EDIT 50

The current contents of line 50 will be displayed. Use the **WordEdit** arrow keys to move the cursor to the end of the line and then delete 10 and replace it with 20. When you have finished editing the line press **Enter**.

If you ever **EDIT** a line and then realise that you would like to keep the old version just press **Stop** and your changes will be ignored. You will find when editing lines that many of the quick methods you may have learnt about in the word processor can be used to move about the line. For example, the left and right arrow keys **WordEdit** pressed with **Ctrl** will move a word at a time and when pressed with **Home** will jump to the start or end of the line.


In our program there is still a problem that the only way to stop the program is by pressing the **Stop** key. As the program keeps waiting to ask for an amount to be input we could arrange for the program to stop running completely if the value 0 were input. Add the following line:

```
15 IF amount = 0 THEN STOP
```

Including this line means that if the value 0 is input when the program is asking for "amount" the program will STOP. **STOP** is a command to BASIC that does exactly what the name suggests and stops a program running returning the BASIC prompt.

The above has given you an idea of the first steps in learning BASIC but unfortunately there isn't room in this manual for a complete tutorial. What we suggest is that you get one of the many hundreds of books available on programming in BASIC and you will find that most of what they say applies equally well to the BBC BASIC in your notebook. If possible, get a book that is specifically written with BBC BASIC in mind.

Example BASIC programs

The following are a few simple programs that give a small taste of what is possible in BASIC on the Notebook. Don't worry too much if you don't understand all the commands used. You will probably find them fun to use even if you do not understand exactly how they work. One thing to watch is that you must type them exactly as shown including all spaces and punctuation symbols. Don't forget to press  at the end of each line that you type.

PROGRAM 1: Reaction time tester

This program uses the 1/100th second clock that BASIC gives access to in order to time your reactions:

```
10 PRINT "Get ready..."
20 D = RND(300)+200
30 TIME = 0
40 REPEAT
50 UNTIL TIME > D
60 PRINT "Press a key..."
70 T = TIME
80 X = GET
90 T = TIME - T
100 PRINT "You took" T/100 " seconds."
```

Line 20 picks a number at random between 0 and 300, adds 200 to it to make it between 200 and 500 and then sets the clock to zero in line 30.

Lines 40 and 50 then delay for that number of 1/100ths of a second (between 2 and 5 seconds)


Line 60 prints the message you must react to. The current time is remembered in variable T and then after the GET statement in line 80 has got a key press a calculation is made to see how much time has elapsed.

This value is printed in line 100 (divided by 100 because it is a measurement in 1/100ths not whole seconds so must be converted).

Type NEW to clear any existing program. Type in the lines above, then type RUN to use the program. You may like to use SAVE to save a copy for later use.

PROGRAM 2 : A musical organ program

```
10 k$ = "ANSEFTGYHUJKOLP;']#+CHR$(13) : Cnote=96
20 a$ = GET$
30 IF a$ = " " THEN STOP
40 IF a$>="1" AND a$<="4" THEN Cnote=48*(ASC(a$)-ASC("0")) : GOTO 20
45 IF a$>="a" AND a$<="z" THEN a$=CHR$(ASC(a$)-32)
50 note = INSTR(k$, a$)
60 IF note = 0 THEN GOTO 20
70 SOUND 1, 0, note*4 + Cnote, 4
80 GOTO 20
```


Line 10 defines a string called k\$ which holds all the keys that the program recognises. The  key is a special case as it returns the value 13 that cannot be typed into a string - hence the "+ CHR\$(13)" at the end of the string. The variable Cnote stores the pitch value for the musical note C. By varying this between 48, 96, 144 and 192 it is possible to play 4 octaves.

Line 20 is the one which reads the keys pressed on the keyboard and puts them into a\$.

Line 30 gives us a neat way to stop the program (without having to hit Stop). It tests to see if the character typed was the space bar and if so the program stops.

Line 40 checks to see if the character type was between "1" and "4". If it was it sets Cnote equal to 48 * the number 1, 2 3 or 4.

Line 45 converts any lower case letters that have been typed into upper case. This relies on the fact that the character numbers of all the upper case letters are exactly 32 less than the lower case letters. ASC converts a string to its character number and CHR\$ converts a character number back to a string.

Assuming the key pressed wasn't 1, 2, 3, 4 or space, Line 50 then looks up the character that has been typed in k\$ and sets the variable called note to be equal to the position number (so A=1, V=2, S=3, E=4 and so on up to =21).

Line 60 then checks to see if note is zero (which means the key wasn't found in k\$). If this is the case a jump is made back to line 20 to read another key.

The program will get to line 70 if the variable note contains a valid note number. This is multiplied by 4 because sounds go up in

semitones not $\frac{1}{4}$ semitones. Finally it is added onto Cnote to make the [^] key, (note=1) note C. The duration of note is set to $\frac{4}{20}$ ths of a second ($\frac{1}{5}$ th) so each key press will just make a short beep.

The last line of the program just directs control back round to line 20 so it will always wait for keys to be pressed (until the space bar is used to stop the program).

Well that's the program but what do you do with it? Well, RUN it and press some keys on the middle line of the keyboard. You should hear musical notes. The keys have been picked to try and imitate the black and white notes on a piano keyboard:

keys [W][E] [T][Y][L] [O][P][X] [] [] []
[A][S][D][F][G][H][J][K][L][;]['] [] [] []

C# Eb F# Ab Bb C# Eb F# Ab

notes C D E F G A B C D E F G

So try tapping in the following tunes (spacing gives an idea of rhythm):

Patriotic:

GG H T GH JJ K J HG HG T G

GHJK LLL L KJ KKK K JH

JKJHG J K L ; K J H GE

Seafaring:

KJK AA GFDG KK ;LK L SS LKJ L ##

Scottish and lyrical:

W T T Y U U Y T T E W W

W T T Y U O P O

O P P O U U O J U Y T E

W W T U O P O U Y T

While you are using the program press the [1][2][3] or [4] keys next to the [Stop] key and see what happens. When you have finished press the space bar to stop the program running.

PROGRAM 3 : Scientific graph plotting

This program asks for a mathematical function to be typed in then plots a curve of it on the screen.

```
10 pi4 = PI * 4 : st = pi4 / 480 : xscale = 480 / pi4
20 INPUT "Function of x to plot (eg SIN(x)) : " func$
30 INPUT "Y scaling value (try 63 to start) : " yscale
40 CLG
50 PRINT TAB(0,0);func$
60 FOR x=0 TO pi4 STEP st
70   y = INT(EVAL(func$)*yscale + 63)
80   PLOT 69, x * xscale, y
90 NEXT x
```

Line 10 defines some constants to be used in the program (you can have several statements on one line separated by colons ";"). The reason for making the variable pi4 is that we use the value of PI (3.14159) multiplied by 4 on several occasions so it is quicker to just calculate it the once. The variable st is used as the STEP value in a FOR..NEXT loop and xscale is used to make sure that the plotted graph will exactly fill the full width of the screen.

Line 20 The user is asked to input a function to plot. BBC BASIC is very powerful in that one can type in a function of x and later have it evaluated even though it is effectively just a string of characters.

Line 30 lets the user set a y scaling value. The reason for this is that some graphs have a much larger amplitude (top to bottom height) than others. Lower values input for y scaling will reduce the height of the graph until it will fit on the screen.

Line 40 clears the graphics screen ready to plot the graph and line 50 just prints the function that has been input as a title. The TAB(0,0) makes sure that the text appears in the first column of the first line on screen

Line 60 sets up a FOR..NEXT loop that will step x from 0 to PI*4 (this is a measure of angle in radians and is the equivalent of 720 degrees or twice round a circle). So that 480 dots are printed across the screen the previously calculated STEP value is used to increase x in a very small increment each time.

Line 70 is the business end of the program that takes the function of x that has been input and evaluates it with EVAL. The resultant y value is multiplied up by the y scaling factor so that numbers between 0 and 1 (such as you get from SIN(x)) will make a

noticeable displacement on the display (+/- 64 pixels from the centre line). The resulting value is added to 63 to position it about the middle of the screen and only the integer part is taken (using the INT function) because co-ordinates with decimal fractions would not make much sense to the PLOT command.

Each dot of the curve to be plotted is individually set by line 80. This uses the ubiquitous PLOT command which has myriad uses. It just happens that "69" is the one that means plot a point at an absolute (x,y) position. A list of all the possible PLOT commands is given later in the manual.

Line 90 just completes the FOR..NEXT loop so that all 480 dots across the screen are used.

When you RUN this program start off with an easy function. Enter "SIN(x)" for the function (the word SIN must be in upper case but x must be in lower case). When asked for the scaling value enter 63.

Having tried that, run the program again but this time enter the function as:

```
SQR(ABS(SIN(x)))
```

again use a scale value of 63. The reason for the ABS function in the above is to prevent the SQR (square root) function being given a negative value which will just cause the program to stop with an error.

For a final run of the program try the very interesting (and complex) function:

```
SIN(x)*COS(x) - SIN(x)*SQR(x)
```

For the scaling value enter 16. This curve starts off with a small amplitude but gets greater and greater as the plot continues.

Try making up your own functions using combinations of the various mathematical functions in BASIC which are listed in the brief summary of all BASIC commands that follows later.

PROGRAM 4 : An analogue clock

```
10 DIM sn%(60), cs%(60), snoff%(60), csoff%(60)
20 CLG
30 FOR theta=0 TO 59
40   sn%(theta) = INT(60 * SIN(RAD(theta * 6)))
50   snoff%(theta) = sn%(theta) + 240
60   cs%(theta) = INT(60 * COS(RAD(theta * 6)))
70   csoff%(theta) = cs%(theta) + 63
80   PLOT 69, snoff%(theta), csoff%(theta)
90   IF (theta MOD 5)=0 THEN PROC_Draw_Hour_Blob(theta)
100 NEXT theta
110 hour$=MID$(TIME$, 17, 2)
120 min$=MID$(TIME$, 20, 2)
130 sec$=MID$(TIME$, 23, 2)
140 PRINT TAB(60, 4);MID$(TIME$, 17, 8)
150 hour=VAL(hour$) : min=VAL(min$) : sec=VAL(sec$)
153 IF hour>12 THEN hour=hour-12
155 hour=hour*5 + (min/12)
160 PROC_Draw_Hand(hour, 0.4)
170 PROC_Draw_Hand(min, 0.8)
180 PROC_Draw_Hand(sec, 0.9)
190 IF INKEY(1)=-1 THEN GOTO 110
200 STOP
300 :
400 DEF PROC_Draw_Hand(time, length)
410 newtime = time
420 IF time=0 THEN oldtime=(time-1) ELSE oldtime=(time+59)
430 MOVE 240,63
440 PLOT 7,sn%(oldtime) * length + 240, cs%(oldtime) * length + 63
450 MOVE 240,63
460 DRAW sn%(newtime) * length + 240, cs%(newtime) * length + 63
470 ENDPROC
480 :
500 DEF PROC_Draw_Hour_Blob(angle)
510 MOVE snoff%(angle), csoff%(angle)
520 DRAW sn%(angle) * 1.1 + 240, cs%(angle) * 1.1 + 63
530 ENDPROC
```

It's a pretty mammoth program but we hope you think it is worth the effort of typing it in!

The program draws a circular clock face and shows the current time that the Notebook's clock is set to as a set of pointers on the clock face. The time is shown as text digits alongside.

There are several ways to draw a circle on a computer. One method is to use the formula for a circle $r^2 = x^2 + y^2$ and rearrange this to give $y = \text{SQR}(r^2 - x^2)$. r - the radius is a fixed quantity (60 in our case) so you just vary x between 0 and r and calculate the corresponding y values and plot the points. However, this only

produces one quadrant to a circle. It is far easier to use the formulae that:

$$x = r \sin(\theta)$$

and

$$y = r \cos(\theta)$$

Then write a program that varies θ between 0 and 360 degrees and calculate the (x,y) points on a circle. This is roughly what the program does. However, it is recognised that a clock face only has 60 distinct points so there is no point in calculating 360 points. So the program just counts θ up from 0 to 59 and then uses the values of COS and SIN of θ multiplied by 6. As there is a lot of sine and cosine calculations to be done, the program does all the calculations at the very start and stores the fixed results in two arrays of variables. In addition to these a second set of arrays hold the same results but shifted across the screen by 240 points and up by 63. (To the centre of the screen).

The arrays are chosen to be integer arrays (that's what the "%" after each name means) this makes them quicker to access and more compact.

While the initial calculations are being made and the 60 points on the clock face are being drawn, a check is made to see if θ is divisible by 5 (using the MOD function). When it is a named procedure (Draw_Hour_Blob) is called to make a bigger mark to distinguish the twelve hour points on the clock face.

Once the face has been drawn the main loop of the program is entered. Every second this reads the setting of the system date and time (in TIMES) and breaks out the hour, minutes and seconds settings into separate strings. The strings are then converted to numbers using the VAL function. For each of the three quantities a call is made to the Draw_Hand named procedure. When this is called two parameters are supplied. One is the setting of hours, minutes or seconds. And the other value passed is the length of the pointer (*1.0 would be as long as the radius of the clock face, *0.4 is $\frac{2}{5}$ th the length of the radius and is used for the hour hand). Once the strings have been converted to numbers the hour value is multiplied by 5 to make it in the range 0..55. One twelfth of the minutes setting is added so that the hour hand will take one of five distinct positions between one hour and the next.

After the calls to draw the hands a check is made to see if a key is pressed. If one is then the program stops, otherwise it jumps back to read the new time and re-draw the pointers. That forms the main loop of the program. Line 300 with a single colon is just a neat way of spacing the lines of the main program from the procedure definitions that follow.

Finally there are the two procedures. The one to draw hands uses two time settings, the current hour, minute or second and the previous hour minute or second. It draws a blank line (PLOT 7) at the old location and then draws in the new pointer. When calculating the previous minute a special case of the hour/min/sec being 0 is made. In this case the previous hour/min/sec would be negative so 59 is added on.

The final procedure is the one that draws the extended legends on the "hours". It does this by drawing lines out from the circle edge to points that are $1.1 \times$ the radius further out.

We hope you enjoy these simple programs and may be inspired to delve deeper into the world of BASIC programming. The range of things you could attempt is endless. How about writing a drawing package? Or a cardfile program? Or a spreadsheet? Or a game? Or a terminal program to use the serial port (hint: treat it like a file called "COM:") ?

Making programs run automatically

If you write a program in BASIC, each time you want to run it it would seem that you have to switch to BASIC by pressing **[Function]** and **[B]**, give a `LOAD "filename"` command and finally type `RUN` to start the program running. If you want to make it easy for others to use your program then give it the special name "AUTO". If there is a file of this name in the Notebook's memory then when you press **[Function]****[B]** the program will be immediately loaded and start running. It is possible to have a second file called `NOTEPAD.RUN` which is also auto-run. This will be loaded and run after the program called `AUTO`.

If such a program contains an `OSCLI("ESC OFF")` command then you might get into the situation that you could never get back to BASIC's immediate mode. This is not a problem. Switch to the wordprocessor's List Stored Documents screen and use **[NAME]** **[R]** to rename the file to something other than `AUTO` or `NOTEPAD.RUN`.

BASIC memory usage

BBC BASIC allocates as much RAM as possible for its use on entry, up to a maximum of about 40 Kbytes for user programs, variables and stack. This figure cannot be increased by the addition of a PCMCIA memory card but such a card would allow several programs to be stored and the `CHAIN` command could be used to switch from one to the next.

If less than 40K of memory is available the value of `PAGE` will be raised accordingly. At least 2 Kbytes of memory will be left free for new files. Note that you must not raise `HIMEM` above its initial value or lower `PAGE` below its initial value; any attempt to do so will most probably crash the machine.

It may also be possible to crash the machine by injudicious use of BBC BASIC's equivalent of the `POKE` command (`?n = x`). Also, almost any attempt to use the assembler built into BBC BASIC will crash the machine. If you do any of these things then the only way to correct matters may be to perform a hard reset by holding down **[Function]****[SIO]** and **[-pm]** when switching the machine on. This will lose all data and documents stored in the machine's memory. It would, therefore, be advisable to avoid using any of these features unless you are absolutely sure you know the effect they may have.

Unlike the Acorn computers that are based on the 6502 processor, the Notebook is based on the Z80 processor. Consequently, the assembler built into the BASIC recognises Z80 mnemonics rather than the 6502 variety. Assembly language programming is such an advanced subject that there is no way it can be covered in this manual. We would warn people not familiar with machine code programming to avoid attempting to use the assembler feature as it will almost certainly lead to a machine crash and subsequent loss of data.

Differences between BBC BASIC on the Notebook and other computers

Not every feature of BBC BASIC is supported by the version in the Notebook. Obviously the sound facilities are very limited and the screen is only 480 pixels wide by 128 pixels deep, also, it can only show two "colours". This does mean that some of the standard BBC BASIC commands are limited on the Notebook.

The following pages comprise a list of all the keywords recognised in BBC BASIC, this is not a complete reference but may be useful to those who already know a version of BASIC.

Following this is a description of operating system specific features of BBC BASIC on the Notebook.

Those language elements which are machine specific, particularly hardware-dependent features, are indicated accordingly. In most cases their operation has been made as compatible as possible with the original Acorn versions, within the constraints of the NC200 design and its operating system:

(e)

(number)

Argument, Result is in r0

sets word pointed to the Arc sine

BASIC Keywords

The following is a list of all the BBC BASIC keywords. Those not supported on the Notebook are noted. Differences in operation of some of the commands is also noted. This list is not intended to be a complete reference of the language. There are many good books available on the subject of programming in BASIC and many of these talk specifically about the BBC version of the language. This list may be useful for those who already know how to program or for those inquisitive beginners who would like to experiment.

ABS

var = ABS (*number*)

Sets *var* equal to the absolute value of *number*. Negative *numbers* are converted to positive. Positive *numbers* are untouched.

ACS

var = ACS(*number*)

Sets *var* equal to the arc-cosine of the *number*. The result is in radians (which may be converted to degrees using the DEG function).

ADVAL

The Notebook has no analogue input port or equivalent. Use of the ADVAL function will result in the error message "Sorry" (error code 255).

AND

var = *number* AND *number*

Sets *var* equal to the logical bitwise AND of the two *number* arguments.

ASC

var = ASC(*string*)

Sets *var* equal to the ASCII value of the first character of the given *string*.

ASN

var = ASN(*number*)

Sets *var* equal to the Arc Sine of the argument. Result is in radians.

ATN

`var = ATN(number)`

sets *var* equal to the Arc Tangent of the given *number*. The result is in radians and may be converted to degrees using the DEG function.

AUTO

`AUTO start, step`

starts generating automatic line numbers at line *start* and goes up by *step*. If *start* and *step* aren't given it starts at 10 and goes up in steps of 10.

BGET

`var = BGET#number`

sets *var* equal to the next character from the file that has been opened as *number*. The file can also be "COM:" for the serial port.

BPUT

`BPUT#number, value`

writes the *value* to a file that has been opened as *number*. The file could also be the serial port "COM:" or the parallel port "LPT:".

CALL

`CALL address, parameters`

calls a machine code subroutine. Not for the faint hearted.

CHAIN

`CHAIN string`

loads and then continues on to run the program stored in the file whose name is given in *string*.

CHR\$

`var = CHR$(number)`

sets a string variable equal to the character whose ASCII code number is *number*.

CLEAR

CLEAR

This resets all dynamic variables to the unused condition. The only variables left intact are the static variables A% to Z% and @%.

CLG

This statement clears the current graphics window (by default the entire display) to the unlit ('white') state. The graphics cursor is not moved.

CLOSE

CLOSE*#number*

Closes the file identified by *number*.

CLS

This statement clears the current text window (by default the entire display) to 'space' characters and moves the text cursor to the top left.

COLOUR

COLOR

The Notebook's (LCD) screen cannot display colours. Use of the COLOUR statement will result in the error message "Sorry" (error code 255). Limited control over text attributes can be obtained with VDU which is explained in the description of VDU.

COS

var = COS(*number*)

Sets *var* equal to the Cosine of the angle *number* which is specified in radians. The RAD function may be used to convert an angle in degrees to radians.

COUNT

var = COUNT

Sets *var* equal to the number of characters sent to the display since the last new line.

DATA

DATA constant, constant, constant...

used to include constant data within a program which may be used by means of the READ command which will read it into variables.

DEF

DEF PROCName
DEF FNname

used to begin the definition of a named procedure or function. The following example may give a taste of how this works:

```
10 PROCtest("Hello World")
20 PRINT FN_Average(3,9,14)
30 END
40 :
50 DEF PROCtest(string$)
60 PRINT string$
70 ENDPROC
80 :
90 DEF FNAverage(n1, n2, n3)
100 =(n1+n2+n3)/3
```

DEG

var = DEG(number)

lets var equal to the *number* converted from radians to degrees. As radians a complete circle is equal to 2π while in degrees a complete circle is 360 degrees so DEG just divides by 2π and multiplies by 360 (which is the same as divide by π and multiply by 360).

DELETE

DELETE start, finish

deletes a range of lines from a program. DELETE 10,100 would remove all lines between 10 and 100 (inclusive). To delete a single line it is easier just to type the line number on its own.

DIM

DIM var, size

reserves space for an array of items. For example DIM A(5) would reserve space for 6 items A(0), A(1), A(2)...A(5)

DIV

var = number DIV number

Sets *var* equal to the integer result after dividing the first *number* by the second. The remainder is discarded. The function MOD can be used to get the remainder.

DRAW *x,y*

Draws a straight line (in 'lit' pixels) between the current position of the graphics cursor and the specified co-ordinates, then moves the graphics cursor to the specified position. The range of co-ordinates corresponding to positions on the screen is 0 to 479 in the x-direction and 0 to 127 in the y-direction. This statement is identical to PLOT 5, *x*, *y*.

EDIT *number*

A single-line editor is provided, which is entered using the command **EDIT** *number*. The contents of two or more lines may be concatenated using the syntax **EDIT** 1,2 but the intermediate line numbers must be edited out, and the original lines deleted, manually. A line may be duplicated by editing only the line number.

ELSE

IF condition THEN ELSE

Used to provide an alternative sequence of commands if the *condition* in an **IF** statement fails.

END

END

Marks the point where you would like the program to stop running and return to the BASIC prompt (>). **END** is not necessary as a program will stop once it has executed the highest line number but **END** makes things tidy and can be used to **END** the program early. It also is used to separate the main program from the procedure and function definitions and other subroutines.

ENDPROC

ENDPROC

Marks the end of a procedure definition.

ENVELOPE

This feature is not supported on the Notebook. Use of the ENVELOPE statement will result in the error message "Sorry" (error code 255).

EOF

var = EOF#*number*

This function returns TRUE if the file pointer is at the end-of-file identified by *number* and FALSE otherwise. In the special case of the serial port ("COM:") TRUE indicates that there are no input characters waiting while FALSE indicates that one or more characters are waiting at the input.

EOR

var = *number* EOR *number*

sets *var* equal to the logical bitwise exclusive OR of the two *numbers*.

ERL

var = ERL

sets *var* equal to the number of the last line that caused an error.

ERR

var = ERR

sets *var* equal to the number of the last error code. The possible codes are:

1 Out of range	18 Division by zero	33 Can't match FOR
4 Mistake	19 String too long	34 FOR variable
5 Missing ,	20 Too big	36 No TO
6 Type mismatch	21 -ve root	38 No GOSUB
7 No FN	22 Log range	39 ON syntax
9 Missing "	23 Accuracy lost	40 ON range
10 Bad DIM	24 Exp range	41 No such line
11 DIM space	26 No such variable	42 Out of DATA
12 Not LOCAL	27 Missing)	43 No REPEAT
13 No PROC	28 Bad HEX	45 Missing #
14 Array	29 No such FN/PROC	
15 Subscript	30 Bad coll	
16 Syntax error	31 Arguments	
17 Escape	32 No FOR	

ERROR

ON ERROR GOTO
ON ERROR OFF

Used to trap errors. When an ON ERROR GOTO command is used subsequent errors cause program control to go to the line identified in the GOTO part of the command. ERR and ERL can be inspected to see what caused the error and if it can be corrected.

EVAL

var = EVAL(BASIC expression in a *string*)

This very powerful command passes the *string* to the BASIC expression handler and then sets var equal to the result. A simple 4 line program will turn BASIC into a scientific calculator:

```
10 REPEAT
20   INPUT "Enter command : " a$
30   PRINT EVAL a$
40 UNTIL FALSE
```

When RUN this might give the following:

```
Enter command : SIN(RAD(45))
0.707106781
Enter command : DEG(ATN(SQR(2)))
54.7356103
Enter command : TIMES
Thu.19 Mar 1992,00:27:42
```

EXP

var = EXP(*number*)

Sets var equal to the natural logarithm base ($e=2.71828183$) raised to the power of *number*. The inverse of this function is provided by LN.

EXT

var = EXT#*number*

This function returns the size, in bytes, of an opened file. In the special case of the serial and parallel ports ("COM:" and "LPT:") a non-zero returned value indicates that the output port is busy and if written to may result in a "Device fault". A returned value of zero indicates that the output port is ready to receive more characters.

FALSE

`var = FALSE`

FALSE is a fixed variable defined as 0. As BASIC uses the value 0 to mean FALSE in conditional tests such as IF and UNTIL you can use FALSE in these situations. For example,

```
REPEAT
PRINT "Hello"
UNTIL FALSE
```

will repeat forever (until Stop is pressed).

FN

```
var = FNname
DEF FNname
```

Used in both defining and using a named function. See DEF for more details.

FOR

`FOR var=start number TO finish number STEP step value`

Used to start a repetitive loop for a fixed number of iterations. `var` will start at the value *start number* and then, each time a corresponding NEXT instruction is executed `var` will be increased by *step value* (or just 1) until it reaches (or exceeds) *finish number*.

GCOL

The Notebook's (LCD) screen cannot display colours. Use of the GCOL statement will result in the error message "Sorry" (error code 55).

GET

`var = GET`

Sets `var` equal to the ASCII value of the next key pressed. Waits for a key to be pressed before returning.

GET\$

`var$ = GET$`

Sets the *string* variable `var$` equal equal to the next character key pressed. It waits for a key press before returning.

GOSUB

GOSUB *line*

A jump is made to the section of program starting at *line*. When the next RETURN command is executed control returns to the statement after the GOSUB command.

GOTO

GOTO *line*

Control is transferred to the *line* identified in the GOTO command. To make programs easy to read the use of excessive GOTO commands should be avoided. It is far better to change the flow of a program using the FOR...NEXT, REPEAT...UNTIL, DEF PROC and GOSUB structures.

HIMEM

HIMEM = *number*

var = HIMEM

Can be used either to set a new high address for the top of BASIC's program memory or to find out what it is currently set to. It is unwise to change this unless you are sure you know what you are doing as you may crash the machine leading to the need to completely reset it and lose all your documents. It is OK to reduce HIMEM but do not increase it above its initial value.

IF

IF *condition* THEN

Used to conditionally execute statements. The condition is tested and if it results in a TRUE (-1) value the statements after THEN are executed.

INKEY

var = INKEY(*time*)

Sets *var* equal to the ASCII value of the next key pressed. Unlike GET it only waits for the length of time given by *time* in centiseconds. If no key is pressed it returns -1. Use of INKEY with a negative argument to test the state of each key independently is not supported.

INKEY\$

`var$ = INKEY$(time)`

Waits for *time* 1/100ths of a second for a key to be pressed and returns the character in *var\$*. If no key is pushed in time it sets *var\$* to the null (empty) string.

INPUT

`INPUT "prompt text", var`

Stops and displays the *prompt text* and then sets *var* equal to the users response. *var* can also be a string variable to allow the user to enter text as well as numbers.

INPUT LINE

`INPUT LINE var$`

Allows the user to type a string of text including commas, quotes and leading spaces and assigns this to *var\$*.

INPUT#

`INPUT#number, var`

Inputs variable *var* from the file identified by *number*.

INSTR

`var = INSTR(string, string to find, number)`

The first named *string* is searched to see if it contains the *string to find* and if so *var* is set to the position in the string where it occurs. The search can be started part way into the string by giving a *number*.

INT

`var = INT(number)`

Converts a real *number* to a lower integer.

LEFT\$

`var$ = LEFT$(string$, number)`

Takes the *number* of leftmost characters from *string\$* and assigns them to *var\$*.

LEN

var = LEN(*string*)

Sets *var* equal to the number of characters in the given *string*.

LET

LET *var* = *value*

LET assigns a *value* to a variable (either number or string). In fact, LET is optional and need not be used. So

LET *x* = *x* + 3

and

x = *x* + 3

are exactly equivalent.


LINE

INPUT LINE

See INPUT LINE.

LIST

LIST *number*, *number*

Lists a program. If a single *number* is given then only that line is shown. If both *numbers* are given then all lines between the two are shown. While a program is listed you can press  to pause the listing. Press it again to stop.

LISTO

LISTO *number*

LISTO is used before the LIST command to control how the subsequent listing is formatted. The *number* affects how the listing is formatted. Valid *numbers* are 0 to 7. LISTO 7 gives the easiest to follow listing.

LN

var = LN(*number*)

Sets *var* equal to the natural logarithm of the *number*. Natural log is to the base *e* (=2.71828183). The inverse of LN is EXP.

LOAD

LOAD *prog_name*

The *prog_name* (in quotes or contained in string variable) is the name of a document that contains a program to load.

LOCAL

LOCAL *var*

Specifies a variable that is only local within a procedure or function declaration. The value is lost (undefined) outside of the proc/fn.

LOG

var = **LOG**(*number*)

Sets *var* equal to the base 10 logarithm of *number*. There is no inverse function of **LOG** as such because the equivalent is to use 10^{number} (ie 10 raised to the power of a *number*).

LOMEM

LOMEM = *var*

var = **LOMEM**

May be used to read and set the point in memory where dynamic data structures will be placed. It would be unwise to change this unless you are absolutely certain that you know what you are doing.

MID\$

var\$ = **MID\$**(*string\$*, *start*, *length*)

Sets *var\$* equal to a string of characters taken from *string\$* starting at position *start* for *length* characters.

MOD

var = *number* **MOD** *number*

Divides the first *number* by the second and sets *var* equal to the remainder. See also **DIV** which sets *var* equal to the integer result of dividing one number by another.

MODE

This feature is not supported on the Notebook. Use of the **MODE** statement will result in the error message "Sorry" (error code 255).

MOVE

MOVE *x,y*

emon_pos

Moves the graphics cursor to the specified co-ordinates, but does not affect what is displayed. The range of co-ordinates corresponding to positions on the screen is 0 (left) to 479 (right) in the x-direction and 0 (bottom) to 127 (top) in the y-direction. This statement is identical to PLOT 4, *x*, *y*.

NEW

NEW

Clears the current program from memory. If you use this accidentally you can immediately use OLD to recover it but OLD will no longer function once you start to enter new program lines or set new variables.

NEXT

NEXT *var*

Used to mark the end of a FOR loop and cause a jump back to the statement after FOR until the loop variable has reached its upper limit. The var name can be used to make sure a jump is made back to the correct FOR command.

NOT

var = NOT *number*

Sets *var* equal to the bit by bit binary Inversion at *number*.

OLD

OLD

Used to recover a program immediately after the accidental use of NEW.

ON

ON *var* GOTO *line, line...*

ON *var* GOSUB *line, line...*

ON *var* PROCone, PROCtwo, ...

Can be used to goto or gosub a number of different lines depending on the value of *var*. Can also be used to call different named procedures dependent on the value of *var*.

OPENIN

var = OPENIN(*string*)

The document/file whose name is given by *string* is opened for input (reading) and a file number is returned in *var*. This may be used in the various file reading commands such as BGET# and INPUT#. If the filename given is "COM:" then input will be read from the serial port.

OPENOUT

var = OPENOUT(*string*)

The document/file whose name is given by *string* is opened for output (writing) and a file number is returned in *var*. This may be used in the various file writing commands such as BPUT#. If the filename given is "COM:" then output will go to the serial port. If the name is "LPT:" then the output will be to the parallel printer port.

OPENUP

var = OPENUP(*string*)

Has the combined effect of OPENIN and OPENOUT. The device or file is opened for reading and writing. Can be used with files and the serial port "COM:"

OR

var = *number* OR *number*

Sets *var* equal to the result of the logical bitwise OR of the two numbers.

OSCLI

OSCLI(*string*)

The *string* is passed to the operating system to be executed. This can be one of the star commands such as *CAT. That is, OSCLI("CAT"). Notice that * is not included.

PAGE

PAGE = *var*

var = PAGE

PAGE can be used to read or set the starting address of the current program area. It would be extremely unwise to change this value unless you are totally certain you know what you are doing.

PI

var = PI

Sets var equal to the value of π 3.14159265, the ratio of a circle's circumference to its diameter.

PLOT

PLOT *n*,*x*,*y*

A multi-purpose plotting statement, whose effect is controlled by the number *n*. *x* must be in the range 0 to 479 and *y* 0 to 127. In the following "relative" means that (*x*, *y*) are added onto the current graphics cursor position to determine the destination. When "absolute" co-ordinates are used they are always specified with relation to the origin of the graphics screen at (0, 0).

<i>n</i>	Action
0	Moves the graphics cursor relative to the last point.
1	Draws a line, in 'black', relative to the last point.
2	Draws a line, in 'inverse', relative to the last point.
3	Draws a line, in 'white', relative to the last point.
4	Moves the graphics cursor to the absolute position <i>x</i> , <i>y</i> .
5	Draws a line, in 'black', to the absolute position <i>x</i> , <i>y</i> .
6	Draws a line, in 'inverse', to the absolute position <i>x</i> , <i>y</i> .
7	Draws a line, in 'white', to the absolute position <i>x</i> , <i>y</i> .
8-15	As 0-7, but plots the last point on the line twice (i.e. in the 'inverting' modes omits the last point).
16-31	As 0-15, but draws the line datted.
32-63	As 0-31, but plots the first point on the line twice (i.e. in the 'inverting' modes omits the first point).
64-71	As 0-7, but plots a single point at <i>x</i> , <i>y</i> .
72-79	Draws a horizontal line left and right from the point <i>x</i> , <i>y</i> until the first 'lit' pixel is encountered, or the edge of the window. This can be used to fill shapes.
80-87	Plots and fills a triangle defined by the two previously visited points and the point <i>x</i> , <i>y</i> .

<i>n</i>	Action
88-95	Draws a horizontal line to the right of the point x,y until the first 'unlit' pixel is encountered, or the edge of the window. This can be used to "undraw" things.
96-103	Plots and fills a rectangle whose opposite corners are defined by the last visited point and the point x,y.

POINT

var = POINT (*x*,*y*)

This function sets *var* to the state of the pixel at the specified location, as 0 (unlit) or 1 (lit). If the specified point is outside the graphics window (taking into account the position of the graphics origin) the value -1 is returned. *x* is in the range 0..479 and *y* is in the range 0..127

POS

var = POS

This function sets *var* equal to the horizontal position (column) of the text cursor with respect to the left-hand edge of the current text window, in the range 0 to 79.

PRINT

PRINT *var*

Prints the contents of a variable or variables and fixed text on the screen. The line of items following PRINT is passed to BASIC's expression evaluator before output is produced. A tilde character '~' can be used before numeric items that should print in hexadecimal. Commas in the print list cause output to start at the next tab stop. Semicolons mean the items follow on immediately adjacent. A single apostrophe forces printing to start on a new line.

Print format can be controlled by setting the variable @% before printing but there are too many options to describe here. The functions TAB(*x*,*y*) and SPC(*number*) can be used in a print statement to either position the cursor at location (*x*,*y*) or at a fixed number of spaces from the current position.

PROC

PROC*name*

Used to invoke a named procedure that is defined using DEF PROC.

PTR

PTR#*number* = *var*
var = PTR#*number*

Allows the random access pointer of file *number* to be read or set.

PUT

PUT *port*, *var*

Outputs a value to an I/O *port* address. It would be very unwise indeed to experiment with this command as you will almost certainly crash the Notebook necessitating a reset which will lose all stored data.

RAD

var = RAD(*number*)

Sets *var* equal to the value of *number* converted from degrees to radians.

READ

READ *var*

Reads data from a DATA statement and assigns it to *var*.

REM

REM *comment*

Allows comments to be added to programs. Anything following REM is considered a remark and will be ignored. It is good practice to include comments in programs so that at a later date you will understand what a particularly complicated line really does! It can also be used to temporarily disable a command while testing a program

RENUMBER

RENUMBER *start*, *step*

Renumbers a program starting at line 10 and going up in steps of 10. If *start* and *step* are given then numbering will begin at *start* and go up in units of *step*.

REPEAT

REPEAT

Used to begin a loop that ends with the command UNTIL.

REPORT

REPORT

This prints the error message associated with the last error that occurred and is usually used in an ON ERROR GOTO trap to print an error message when your program determines that the error which has occurred is not one that it can cope with.

RESTORE

RESTORE *line*

When using READ to read data from DATA statements, RESTORE can be used to set the reading pointer back to a specified line so that data can be re-read.

RETURN

RETURN

Used at the end of a section of program that has been jumped to by the GOSUB command. Control returns to the statement after GOSUB.

RIGHT\$

var\$ = RIGHT\$(*string\$, number*)

Makes *var\$* equal to the string of characters taken from the rightmost end of *string\$* and of length *number*.

RND

var = RND(*number*)

Makes *var* equal to a random number between 1 and *number*. If *number* is not given then the *var* is between 1 and &FFFFFFF. If the given *number* is negative then the random number generator is set to a value based on that number and that *number* is returned in *var*.

RUN

RUN

Starts running the program currently held in memory.

SAVE

SAVE *prog_name*

The current program in memory is saved to a document called *prog_name* (this may be either a name in quotes or a *string* variable).

that contains a name to use). It is very important to **SAVE** a program you are working on before switching away from BASIC (or typing *QUIT) as the program is not automatically saved.

SGN

var = SGN (number)

Sets *var* equal to -1 if the *number* is negative, +1 if it is positive or 0 if *number* is zero.

SIN


var = SIN(number)

Sets *var* equal to the Sine of the given angle which must be specified in radians. The RAD function can be used to change an angle in degrees into radians before using the SIN function.

SOUND

SOUND channel, volume, pitch, duration

SOUND will make a sound on the Notebook's speaker. The Notebook has two sound channels so *channel* must be either 1 or 2. The volume is not variable so the *volume* parameter is ignored. The *pitch* specifies the note to be played. A value of 100 is middle C. Although each step of the pitch parameter should change the pitch by a quarter semitone, the Notebook can only play notes in steps of a semitone so there is no point using values that are not a multiple of four. A *pitch* value of 0 will switch a sound channel off.

The *duration* is given in twentieths of a second in the range 0 to 254. The value -1 or 255 causes an indefinite sound, which can be stopped only by issuing another SOUND statement or by pressing the  key. So, for example:

SOUND 1, 0, 136, 20

Will play the A above middle C on channel 1 for 1 second (20/20ths).

To play a two note chord, use a SOUND command with a duration of -1 to start the first note on channel 1 and then use a second SOUND command to play the other note "on top" on channel 2. Sounds can be made to stop playing by using another SOUND command with a duration of 0.

SPC

PRINT SPC(*number*)
INPUT SPC(*number*)

HAI

AT = 10V

When used in either a PRINT or INPUT command it prints *number* spaces before any following text.

SQR

var = SQR(*number*)

lets var equal to the square root of *number*.

STEP

OR var=start TO finish STEP *step*

Allows a FOR..NEXT variable to be increased (or decreased) in steps other than one.

STOP

TOP

Just like END it stops a program running but prints a message to say where the program stopped. Liberal use of STOP commands can help when developing a program to trace the flow of execution.

STR\$

var\$ = STR\$(*number*)

lets a *string* to be equal to a *number* in the same format that it could be printed in. If a tilde is included between the \$ and open parenthesis the *number* will be converted to hexadecimal.

STRING\$

var\$ = STRING\$(*number*, *string*)

lets var\$ equal to *number* repetitions of *string*.

TAB

PRINT TAB(x,y)
INPUT TAB(x,y)

used to arrange for the printed output of a PRINT or INPUT command to appear on the screen at location (x,y) with respect to the current text window.

TAN

var = TAN(*number*)

Sets *var* equal to the Tangent of the angle *number*. This must be specified in radians. To use degrees use the RAD function to convert the value from degrees to radians before using TAN.

THEN

IF *condition* THEN

Introduces the statements in an IF command that should be executed if the condition is met. The use of THEN is optional but makes programs easier to read.

TIME

TIME = *var*

var = TIME

A variable that can be set and read to measure elapsed time. It increases once every 1/100th of a second. Typically this is used to measure a fixed amount of elapsed time. For example:

TIME = 0

REPEAT

UNTIL TIME > 1000

would pause for approximately 10 seconds.

TIMES

var\$ = TIMES

TIMES = *var*\$

Sets *var*\$ equal to a *string* which contains the current date and time in a fixed format. MID\$ can be used to pick selected fields from this. It is also possible to set the date and time stored in the Notebook by setting the TIMES variable. The format of the returned string is "Day, dd Mon yyyy, hh:mm:ss" where Day is the day of week, dd the day of month, Mon the month, yyyy the year, hh the hour (00-23), mm the minute and ss the second. The time, date or both time and date may be set by including the appropriate fields. When setting the clock the day of week is ignored and may be omitted.

TO

FOR *var* = *start* TO *finish*

Used in a FOR statement to divide the starting value from the end value of the loop variable.

TRACE ON

TRACE OFF

RACE number

The command TRACE ON will cause BASIC to print the number of each line it executes in square brackets to allow the flow of execution to be followed. Tracing can be turned off using the command TRACE OFF. If the command TRACE *number* is used then only line numbers below *number* will be printed. By placing all subroutines at high numbered lines and the main program in the low numbered lines you can arrange to only show tracing of the main part of the program.

TRUE

```

    .or = TRUE

```

- Sets var to be equal to the value -1 that BASIC understands as TRUE
- IF and UNTIL expressions

JNTIL

NTIL condition

ends a loop started by the REPEAT command. As long as the condition is not met a jump will be made back to the statement after REPEAT.

JSR

$$r = \text{USR}(\text{number})$$

Calls a machine code routine at address *number* and returns the value of the HL and HL' registers to the named variable. Not a command for the uninitiated in the black art of machine code programming.

AL

```
pr = VAL(string)
```

converts as much of a string that can be interpreted as a number to a numeric value and assigns it to var.

VDU

VDU number, number,

Passes the elements of the list to the VDU emulator (see full description below). Items terminated by a semicolon are sent as 16-bit values, LSB first.

All console output is passed to a software emulator of the BBC Micro's VDU drivers. VDU codes perform a function similar to those of the BBC Micro, consistent with the hardware and Operating System differences:

VDU 0 Ignored

VDU 1,n The following byte is sent to the printer, if enabled (with VDU 2). If the printer is not enabled, the byte is ditched. Any 8-bit value (0-255) can be sent. This works even when the VDU is disabled with VDU 21.

VDU 2 Enables the printer. Subsequent characters are sent both to the screen and to the printer. The only control characters sent to the printer are BEL (7), BS (8), HT (9), LF (10), VT (11), FF (12) and CR (13). Bytes which are parameters for VDU commands are not sent to the printer, e.g. VDU 27,13 does not send a carriage return to the printer.

VDU 3 Disables the printer. Cancels the effect of VDU 2.

VDU 4 Causes the text cursor to be displayed.

VDU 5 Causes the text cursor to be hidden.

VDU 6 Enables the screen display. Cancels the effect of VDU 21.

VDU 7 Causes a "beep".

VDU 8 Moves the text cursor left one character. If it was at the left edge of the window, it is wrapped to the end of the previous row (right-hand edge of window). If it was also on the top row of the text window, it is moved to the bottom row.

VDU 9 Moves the text cursor right one character. If it was at the right hand edge of the window, it is wrapped

to the beginning of the next row (left-hand edge of window). If it was also on the bottom row of the text window, it is moved to the top row.

- VDU 10 Moves the text cursor down one row. If it was on the bottom row of the text window, the window scrolls up.
- VDU 11 Moves the text cursor up one row. If it was on the top row of the text window, it is moved to the bottom row.
- VDU 12 This is identical to CLS in BASIC. It clears the text window to space characters and moves the text cursor to the 'home' position (top-left corner of the text window).
- VDU 13 Moves the text cursor to the left-hand edge of the window, but does not move it vertically.
- VDU 14 Enables inverse text.
- VDU 15 Disables inverse text. Cancels the effect of VDU 14.
- VDU 16 This is identical to CLG in BASIC. It clears the graphics window to unlit ('white') pixels. The graphics cursor is not moved.
- VDU 17 Enables bold text.
- VDU 18 Disables bold text. Cancels the effect of VDU 17.
- VDU 19 Enables underlined text.
- VDU 20 Disables underlined text. Cancels the effect of VDU 19.
- VDU 21 Disables VDU output. All subsequent VDU commands except 1 to 6 are ignored. If the printer is enabled, VDUs 7,8,9,10,11,12 and 13 will still be sent to the printer.
- VDU 22 Ignored
- VDU 23 Ignored

VDU 24, leftx; bottomy; rightx; topy;

Sets the graphics window. Horizontal (x) co-ordinates are in the range 0 (left) to 479 and vertical (y) co-ordinates in the range 0 (bottom) to 127.

VDU 25, n, x; y;

This is identical to PLOT n, x, y in BASIC. See PLOT for more details.

VDU 26

Resets the text and graphics windows to their default positions (filling the whole screen), homes the text cursor, moves the graphics cursor to 0,0 and resets the graphics origin to 0,0.

VDU 27, n

Sends the next byte to the screen without interpreting it as a control code. Allows graphics characters corresponding to VDU 0-31 and VDU 127 to be displayed. Acts in a similar way to VDU 1 for the printer.

VDU 28, leftx, bottomy, rightx, topy

Sets the text window. Horizontal (x) co-ordinates are in the range 0 (left) to 79 and vertical (y) co-ordinates in the range 0 (top) to 7.

VDU 29, x; y;

Moves the graphics origin to the specified co-ordinates. Subsequent graphics co-ordinates are with respect to this position.

VDU 30

Homes the text cursor, to the top-left corner of the text window.

VDU 31, x, y

Identical to PRINT TAB(x, y); in BASIC. Positions the text cursor according to the next two bytes. The co-ordinates are with respect to the edges of the current text window.

VDU 127

Backspaces the cursor by one position and deletes the character there.

VPOS

var = VPOS

Sets *var* equal to the vertical position (row) of the text cursor with respect to the top of the current text window, in the range 0 to 7.

WIDTH

WIDTH number

Sets the width of print zones. A value of zero will stop it taking any action.

Operating System Commands

The following Operating System commands are implemented. They may be accessed directly (e.g. *BYE) or via the OSCLI statement (OSCLI "BYE").

***BYE**

QUIT

Exits from BASIC and returns control to the Operating System.

CAT

DIR




Lists a catalogue of all the stored files.

DELETE *filename*

ERASE *filename*

Deletes the specified file.













ESC (ON|OFF)

Enables or disables the abort action of the  key which is known in BASIC as the ESCape key; after *ESC OFF the  key simply returns the ASCII code ESC (27). *ESC ON, or *ESC, restores the normal action of the  key.

EXEC *filename*

Accepts console input from the specified file instead of from the keyboard (note that GET and INKEY always read from the keyboard).

***KEY *n* (*string*)**

Redefines a key to return the specified string. The key number *n* is from 0 to 127, where 41 to 66 correspond to  to  respectively. The string may contain the "escape" symbol  in order to insert non-printing characters. For example, M indicates , ? indicates DEL,  indicates the character  itself and  causes bit 7 of the following character to be set. If the string is enclosed in quotes (which is optional)  allows the character " to be included.

LOAD *filename* *oooo

Loads the specified file into memory at hexadecimal address *aaaa*. The load address must be specified, and point to a valid memory location.

PRINTER *n

Selects the printer as parallel (*n*=0) or serial (*n*=1).

RENAME *oldfile* *newfile

Renames the file *oldfile* as *newfile*.

SAVE *filename* *oooo* *bbbb

SAVE *filename* *aaaa* *+llll

Saves a specified range of memory to a file. The address range is specified either as start address *aaaa* and end address *+1 bbbb* or as start address *oooo* and length *llll*.

***SPOOL (*filename*)**

Copy all subsequent console output to the specified file. If the *filename* is omitted, any current spool file is closed and spooling is terminated.

! *comment

This is a comment line. Anything following the ! is ignored.

Note: To type the  symbol hold down  and press .

BASIC and the Printer

To list a program on the printer type:

VDU 2

LIST

When listing is finished type VDU 3 to cancel printer output.

To have the output of a PRINT command in a program only output on the printer use something like the following:

```
10 VDU 2:VDU 21
```

```
20 PRINT "This only appears on the printer"
```

```
30 VDU 3:VDU 6
```

Operating System error messages

These (trappable) errors are related to operating system functions:

Access denied (189):	An inappropriate operation was attempted on a device (e.g. reading from the parallel port).
Bad command (254):	A star command was invalid or incorrectly formed.
Bad key (251):	An attempt to define a function key string failed.
Bad string (253):	A string was too long, or had unmatched quotes.
Channel (222):	The channel number passed to a filing function was invalid
Close error (200):	An error occurred when trying to close a file.
Device fault (202):	A time-out occurred when reading or writing a device.

File creation error (190):

An OPENOUT, SAVE, *SAVE or *SPOOL failed, because the specified file could not be created (e.g. too many files).

File exists (196):

A *RENAME command specified the new name as the name of an existing file.

File not found (214):

A LOAD, *LOAD, *EXEC, *DELETE or *RENAME failed, because the specified file did not exist.

File write error (198):

An error occurred when writing a file with SAVE, *SAVE, PRINT#, BPUT# or *SPOOL, e.g. because of insufficient memory.

Too many open files (192):

An attempt was made to exceed the maximum number of open files (7).


The Notebook Spreadsheet Guide

Introduction

What is a Spreadsheet?

A spreadsheet is the general name given to those utilities that lay out data, primarily numeric, in rows of lines and columns, similar to a balance sheet or calculation sheet written out on paper.

In the same way that the word processor in your Notebook offers considerable advantages in terms of power and flexibility over a typewriter, so a spreadsheet can provide you with all sorts of new time saving and useful features. It also lets you work on an electronic sheet that is far larger than any simple paper display could sensibly be.

By its very nature, a spreadsheet is more complicated to learn than the word processing function built into the Notebook. However, the Notebook spreadsheet does try to help you as much as possible and will always guide you as to exactly what you can type at any moment. As you make entries it will check what you are typing and as soon as you enter something incorrectly you are warned of the problem. At any time you may press the  key to bring up a panel of help information that describes the function you are currently trying to use.

Although it may at first seem that there is a lot to learn you will find that the Notebook spreadsheet is just as happy multiplying $2*2$ as it is solving complex engineering calculations. You should not be daunted by the size of the manual. The Notebook spreadsheet contains some very sophisticated features that allow extremely complex tasks to be tackled with ease but the information has been laid out such that you can quickly and easily find just those features that you require and can ignore the rest. We do recommend, however, that you familiarise yourself with all the options available. You may well discover that there are many built in shortcuts designed to make life easier for you.

As well as providing all of the traditional features that you would expect from a spreadsheet program, the Notebook spreadsheet has been extended in many ways to give you completely flexible control over your everyday data handling and calculation

problems. You will find that it can often be used for things other than a spreadsheet is traditionally used for. For example, you could use it for storing data such as names and addresses.

No programming language will have to be learnt in order to use the Notebook spreadsheet, although for greater flexibility it incorporates some looping features found in high level languages. It will allow you to do most day to day calculations, book keeping and accounts right up to complex scientific equations. The graphics features allow you to produce many different options of graph and chart display which can be sent to a printer (Epson compatible), use some simple database-like functions such as sorting and searching the data. Date and time functions can be built into the sheets.

You will also find that the Notebook spreadsheet is one of the most 'intelligent' programs available. Most computer utilities waste an enormous amount of their potential working time just sitting around waiting for the user to decide what has to be done next. You will find that the Notebook spreadsheet works much harder than that. Commands or data that you enter are checked for mistakes as you type each character rather than when you enter the whole line, or even worse, when the program attempts to do a calculation based on the entry. The result is that there is absolutely no ambiguity about what you have done wrong.

This error handling extends far beyond a simple check of whether the entry is valid in terms of what commands and entries the computer will understand. The Notebook spreadsheet will also attempt to see whether the entry makes sense in terms of the whole sheet as it is currently set up. For example, in most spreadsheets it is important to avoid a forward reference when entering data in a formula e.g. it is usually impossible to enter a calculation in row A, line 1 that reads $2*B2$. You will understand that you want the value in B2 to be worked out BEFORE that in A1 or it doesn't make sense but most programs will attempt to do it the other way around. The Notebook spreadsheet works out an 'Order of Recalculation' number for each item as it is entered which ensures that the logical results that you intended from your sheet are preserved without any need to re-organise the arrangement of the rows and columns.

These features may mean that people familiar with other spreadsheet programs will find that many of the restrictions they have been accustomed to simply do not exist.

The Spreadsheet Section of the manual

The section of the manual that describes how to use the spreadsheet has been divided into logical parts designed to make it as useful as possible for both novices and more experienced users alike.

It's impossible in any manual to be able to arrange the information to suit everybody. It is more important to present the information in a logical order and make it easy to find.

Part One(a) is a Getting Started guide giving details of various fundamental aspects of the program such as which keys can be used. It explains some of the special terms used when describing worksheets. It should be read by every new user of spreadsheets. After this, skip to Part Two, The complete Tutorial Guide..

Part One(b) is a Getting Started guide for users who are already familiar with spreadsheet programs and want to get going quickly with the Notebook spreadsheet. Such users will probably also find it worthwhile to read through Part Two, the Tutorial guide, though they may find the later chapters of more interest.

Part Two is a comprehensive Tutorial guide mainly aimed at new users of the spreadsheet. Experienced users may choose to skip to later chapters or Part Three. The tutorial will take you step by step through the various procedures involved in creating a new worksheet and entering and manipulating data. Not all of the various commands and aspects of the program will be detailed in this section. Certain of the later chapters can be omitted if the lessons within are not of interest but the early chapters are important in getting you used to the way that the program behaves and handles the data. Some examples of use are also given.

Part Three is designed as an overview of the spreadsheet and recap of the tutorial for those who have had some experience in the use of the Notebook spreadsheet or similar products and who wish to find details of some commonly used options in a hurry. References are given showing where more information on each section can be found. It is recommended that beginners use this only as a reference guide and supplement to the main index. If you find some of the subjects hard to follow you should read the tutorial section itself.

Part Four is the Complete Reference where full details of every command and feature are laid out in alphabetical order. This will probably be the most frequently consulted area of the book for those more experienced users who are aware of the program's capabilities and who wish to exploit more sophisticated routines.

Whilst we can teach you the various features of the Notebook spreadsheet it is not possible to give advice on all the many possible uses to which it can be put, though the tutorial chapters do give some examples.

SPREADSHEET GUIDE - PART ONE(a)

Getting Started for Beginners

The following part of the spreadsheet manual gives you practical information about getting ready to use the Notebook spreadsheet, the screen, the keyboard and some other points you will need to know to use it effectively. Most of these points are covered later in the manual but this first introduction may avoid some puzzlement. If you don't understand some of this section at this stage, don't worry, be prepared to re-read the section at a later stage.

Using the Notebook spreadsheet

At any time, while using the Notebook, you can switch to using the spreadsheet by holding down the Yellow key and pressing the White key. After a moment or two you should see a screen like this.

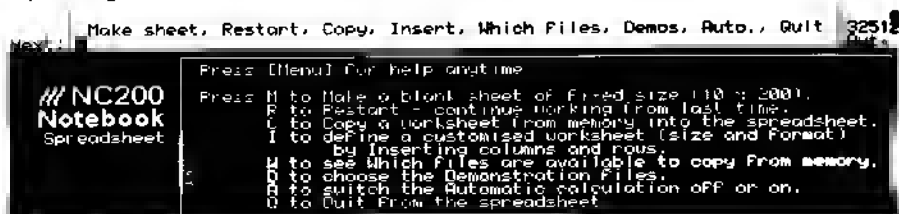


Just like in the word processor, you have three possible options. The first, accessed by pressing the Red key, is where you first begin and you start the spreadsheet program with nothing loaded. You can then start a completely blank sheet and input your data.

By pushing the Green key you will see a list of any worksheets that you have already created. From this you can select one of the stored worksheets (name ending .MFM) and the spreadsheet will be started with that file loaded in for you to continue work on it.

The Blue key from the above screen also accesses a list of spreadsheet files but when you select one it is loaded and a print operation is started.



To begin to actually use the spreadsheet, start at the above screen by pressing the Yellow and White keys, then press the Red key to select the "Start a new Worksheet" option. You will then see the opening screen of the spreadsheet:

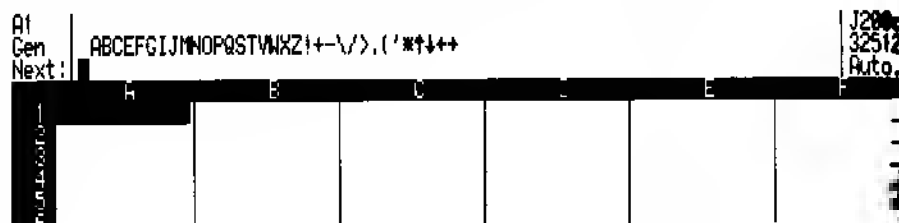


Don't do anything yet but note that the only options open to you at this stage would be to make a sheet of predetermined size and format, restart at the point you had reached when you last used the spreadsheet, copy in an existing worksheet or to start a new one from scratch (by inserting new columns and lines). "Which files" will list any worksheet files already stored in the Notebook. "Auto" lets you switch off the automatic recalculation feature before loading in a large and complex sheet. The Demo option will give you access to some special demonstration worksheets built into the Notebook.

Details of the screen.



To introduce you to the spreadsheet's normal working display here is a quick rundown of what the various pieces of information on the screen stand for. If you have not used a spreadsheet program before you should not worry if you can't take it all in at once. Just use this section for reference as you progress through the tutorial course.

Press the  key to select "Make sheet" and then press the  key. This makes a blank sheet with 10 columns and 200 lines where each cell will display numbers in a general numeric format.



The screen is divided into two main areas, the worksheet itself which


takes up the majority of the bottom of the display, above this is a three line status area giving further information on the state of the sheet.

Press the  key. Notice that the display switches to show you as much of the worksheet as possible. Fifteen lines of data cells are shown. Only the top line is used to show you the column labels. You can continue to type in commands to the spreadsheet although you won't be able to see what you are typing. You switch back and forth between this enlarged display and the normal display each time the  key is pressed. Even when you are part way through entering a command, you can switch between the normal and this enlarged display. Switch back to the normal display now.

Starting with the top line of the status area, on the leftmost side is a figure showing the co-ordinates of the currently active cell (A1 in this case). This is followed, to the right of the dividing line, by the CONTENTS LINE which will display the information that is actually held in the current cell, as opposed to the information that has been calculated and displayed in the worksheet area. (At present it is just blank because no data has been entered).

You will often find that the value shown on the contents line is quite different to the value shown in the worksheet area of the display. The way the values in worksheet display are shown is completely dependent on what display format has been chosen for them. Formats are an important topic to understand when using a spreadsheet and the subject is covered in quite some detail later in the manual.

On the right side of the top line is the co-ordinate of the bottom right cell in the currently defined sheet - J200 in this case. This gives you an indication of the size of the work area. In this case there are 10 columns (labelled A..J) and 200 lines (1..200).

When you first start to use the spreadsheet you will also see the letter "c" in the top right corner. This indicates that Caps Lock is switched on. Caps Lock will always be switched on when you start to use the spreadsheet and will be restored to its former setting when you stop using the spreadsheet. The reason that it is switched on is that normally you will work in columns A..Z and it ensures that when you enter co-ordinates you use the upper case letters. When you come to type in text, such as labels, you may find it easiest to switch Caps Lock off by pressing the  key.

The second line begins with a shortened description of the display format that is in operation on the current cell. This currently shows "Gen" which means that the active cell (A1) has a General format.

Next to this is the prompt line on which you are presented with a summary of all the keypress options available to you at that time.

The prompt line that you saw on first starting the spreadsheet presented you with the options:-

Make sheet, Restart, Copy, Insert, Which files, Auto., Demo, Quit

This is typical of the Notebook spreadsheet prompt lines and the meaning of each of the commands can be looked up in the manual. Because you used the [M] option (Make blank sheet) you are now presented with this line:

ABCEFGIJMNOQRSTUVWXYZ!+-\/>.('*↑↓←→

This line can be regarded as the central command panel for the spreadsheet. At this point there is almost every available option open to you, in fact there are so many that it is impossible for the prompt line to give any more help than to provide you with the first letter of each command name that is available (single letter mnemonics).

If at any time you cannot remember what any letter or symbol stands for, consult the built-in manual by pressing the [F1] key and the Notebook spreadsheet will be able to provide you with a more detailed explanation of the available options. If you do press [F1] you will see the first 16 lines of help information. Press any key, [F1] for example, to see the subsequent pages of information. After the last you will return to the same prompt.

All commands that are available with the spreadsheet work on a system whereby you are provided with prompts to remind you of what is available.

You select the desired command by a one letter keypress based on a mnemonic of the full command name. You will find this a very convenient and easy method to use but you must get used to not attempting to type the command in full or you may end up in some unexpected places. Don't worry if this happens - just press [STOP] and you will be back to something you recognise with no harm done.

Watch the prompt line while you are finding your feet to keep track of all the available options.

At the right hand end of the second screen line is a figure representing the number of bytes of available memory left in your current sheet. A byte is just a technical word meaning a storage location that can hold one character. The spreadsheet will keep track of how many bytes are free and will not let you lose your work if all the memory is used up.

The Notebook spreadsheet has three ways of working depending on how much memory is free when it is started. If there is 65,000 bytes (or more) of free RAM available then it will start up in a way that provides you with about 32512 bytes of storage for spreadsheet data. If, however, you have already stored quite a lot of information in your Notebook then the available memory may be more restricted and you will see that there are only 20224 or even 8064 bytes free when you first start. If you put a PCMCIA memory card into your Notebook and store most of your data on that then you will always have the maximum amount of memory free for spreadsheets.

NOTE: The graphics facilities of the spreadsheet require a lot of memory to work and will only be available when you have more than 65,000 bytes free in upper memory before you start the spreadsheet.


The last line of the status area begins with the prompt **Next:** followed by the entry line. The entry line displays the commands or data that you are currently typing into the sheet. In the case of the commands each single keypress is expanded into the full command word, or words, that it represents.

Usually, on this line may (or may not) be the message **Auto.** which, if present, signifies that the Automatic calculation feature is in operation. You will learn more about this later.


There is a flashing block after the word **Next:** which shows your current position on the entry line as you type. Normally this would be referred to as a cursor (just like the "cursor" in the word processor). However, the spreadsheet has a second, usually larger, cursor which shows which is the active cell. For this reason, the cursor on the text entry line will always be referred to as the CUE in a spreadsheet section of the manual to avoid confusion.

The main worksheet will be formed below the entry line. As you selected the Make blank sheet option from the opening screen, the area is already filled with cells that are 12 characters wide and in General format. (Formats will be explained in more detail later). These cells are labelled 1 to 12 vertically and A to F horizontally. The blank sheet is actually 10 columns wide and 200 lines deep. You can add further columns using the Insert command.

Unlike many other spreadsheet programs you are not limited by available memory to how large the sheet can be. Any Notebook worksheet can be up to 52 columns and 255 lines, regardless of available memory, because unoccupied cells do not consume any space. As you fill cells the available memory will be reduced and this is what will actually limit how much data you have in a spreadsheet. As a rough guide, the maximum number of occupied cells you can have is about 1,800 but this depends on the contents of the cells.



The final thing to be learnt is there is a second type of worksheet display that you can toggle on or off with  (for eXchange) command. In this case each cell shows the information that was entered directly into it irrespective of the result of any calculations or of the selected display formats. This option will only be of use when you have entered some data into the worksheet.




When you use the X command it may be necessary to make adjustments to the column widths to be able to view all of the data or formulae that have been entered.



When you switch the formula display in this way, if you press the  key the free memory value will change. The value now shown is the amount of space available for cell indices. Each time you enter data into a cell the data itself is stored and the "normal" free memory figure is reduced but, in addition to this, an entry is made in an index table to keep track of which cells are occupied. This second free memory figure shows you how much free space is remaining in the index table.

The Keyboard

Again, for reference purposes, here is a rundown of some of the keys you will be using most often. Don't worry about trying to remember it all first time, practice will make them familiar.

You probably know about upper and lower case characters. You hold down a shift key while typing a letter to get the upper case capital form. Notice that the first 26 columns in any sheet are labelled A..Z in upper case and you must type any cell co-ordinates in the correct case. If you type a..z when you really mean A..Z you will actually be trying to select columns in the range 26..52. To help you, Caps Lock is switched on when you start the spreadsheet so that you don't need to remember to hold down  when typing A..Z. In fact, while Caps Lock is on (indicated by a "c" at the top right of the display) you will find that  switches back to using the lower case letters.





There is also a second form of shift key which is marked Control. This is held down in the same way as the shift while a letter is typed. -H means hold down the  and type the letter following the dash, in this case, .





The  key is well named and very important. It is used to let you exit without harm from any commands that you may have set into motion and then regretted. You are returned back to the primary command prompt ABC etc.. If you press  a further time from here you will leave the spreadsheet and return to the previous Notebook menu. If you subsequently restart the spreadsheet and wish to continue from exactly where you left off you just need to select the Restart option from the opening screen. (This actually loads a temporary copy of your work from a file called `ESTART.MEM`. This will be explained later).

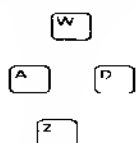
Most of the alphanumeric keys will be used at one time or another to represent various choices for the single-key-entry commands.


It is possible that you may be able to enter commands faster than the Notebook spreadsheet can process them. The spreadsheet has a built in type ahead facility which stores these commands until they can be processed. If the commands cannot be accepted you will hear a beep and whatever you typed will be ignored.









Keys used to move the cursor



The cell cursor can be moved around the worksheet using the arrow keys - , ,  and . If you try to move off the top, bottom or edge of the sheet you will see the message "outside worksheet".















As well as using the arrow keys to move the active cell cursor, the keys , , ,  can also be used to move around the sheet acting as mnemonics for the commands Up, Down, Left and Right. These have the additional advantage that they can easily be incorporated into a command Macro. (A macro is just a technical word meaning a list of stored commands. This is explained later in the manual) For those who prefer to use a diamond shaped layout of cursor control keys the



keys may be used in conjunction with Control, . In summary, the keys you may use to move the active cell cursor by single movements are:

 , U,  -W	cursor up
 , D,  -Z	cursor down
 , L,  -A	cursor left
 , R,  -D	cursor right

Each press of the arrow keys will move the cursor by one cell. You can also make bigger movements to navigate around your worksheet more quickly. When pressed with Shift, , and Control, , the arrow keys have the following effect:

 or -	Move up a page
 or +	Move down a page
 ,  -W	jump to left edge on current line
 ,  -Z	jump to right edge on current line
 ,  -W	jump to top cell in current column
 ,  -Z	jump to bottom cell in current column
 ,  -W	jump to cell at top left of defined worksheet
 ,  -Z	jump to cell at bottom right of defined worksheet

The  Jump command can also be used to jump the cursor to selected cell.

How to Get Help

If, at any time, you find that you do not recognise or cannot remember the prompts that are displayed on the screen, pressing the **[F1]** key will call up explanatory text that may be sufficient to answer all of your queries.

You can summon a help screen at any time, except when editing a cell.

The first 16 lines of help information are displayed. Press any key to see the next 16 lines and so on until you have seen all of the help text. After the last key press you will be returned to the point at which you pressed **[F1]**. Press **[Esc]** to leave help early.

The help that you call up is "context sensitive". What this means is that if you have started to use a particular command and then press **[F1]**, the help you receive will relate to that command. So, for example, if you press **[F]** (which selects the Format command) and then press **[F1]** the help you receive will describe the Format command. At the opening screen and main ABCEF... prompt the help you get is more general.

Terminology

Before we can go on to discuss the finer features of the spreadsheet we must first deal with some matters of terminology. Throughout this manual the program that you use to enter numerical data is called the SPREADSHEET and the collection of data you build with it is called a WORKSHEET. In other programs you may often see the word spreadsheet used to describe both the program itself and the worksheets that are produced by it. This can be confusing so is not done in this manual.

The worksheet is like an enormous piece of paper divided into a grid by vertical COLUMNS and horizontal rows or LINES. By convention the lines are numbered down the page from 1 and the columns are labelled alphabetically from left to right starting with A to Z, followed by a, b, to z (If you use a..z where you meant to use A..Z you will get unexpected results or an 'Out of Range' error message.). Caps Lock is normally switched on to help you to enter A..Z. Press **[Caps Lock]** if you want to switch it off while entering text information.

The smallest unit of the worksheet is a CELL, produced at the crossing point of one line and one column. Each cell is referred to by its column and line co-ordinates. e.g. A1, B12 etc. The cell is where you enter each individual unit of your data, and each piece of data is known as an ENTRY. The entry can be of three types: text, numbers or a mathematical formula known as an EXPRESSION that resolves to a numerical value.

Since you are concerned with entering information into one cell at a time, the currently active cell position is shown on screen by a CELL CURSOR cell printed in inverse text. Information about the current cell is displayed on top of the screen, as described above.

The lines of the sheet are, again by convention, only one character deep. The cells are displayed with the boundaries shown by upright bar characters '|'. However, the size of each cell is not in fact limited by the size of the display, but rather can hold any length of data you wish to enter up to a maximum determined by the width of the screen. If the display size is smaller than the length of the data then the spreadsheet displays as much of it as it can. If text or some warning characters (***) if numbers so you are not misled by truncated figures. In either case no information is lost.

Any data, text or numeric, that will be used by the program in its calculations or other manipulations must, by necessity, be restricted by the maximum size of the cell, but it is important to understand that it is not restricted by the apparent size of the cell on the screen, which can be shortened down to only one character wide.

The Notebook spreadsheet will display as much of the information held in that cell as is possible given the limitation of the display and of the display FORMAT (don't worry about what a Format is just now, it will be dealt with in more detail later). The true value of the data is used in all calculations regardless of the way it looks in the worksheet display.

As an exception to the above rule it is possible to specify that the data should be spread over several cells to act as permanent visible comments on the data that is being displayed. This is known as a HEADING.

The worksheet itself can be many times larger than can fit on screen at any one time - in fact up to a maximum of 52 columns by 255 lines.

You will find that as you move the current cell cursor position your view of the sheet will move with it, changing the cells that are displayed. In computer terms you have a scrolling window onto the sheet.


As well as entries, columns and lines the spreadsheet is also able to manipulate specified BLOCKS of the worksheet. Consider a block as a rectangular area of the sheet which you define by giving the co-ordinate of the top left and then the bottom right corners. You will find this feature very useful. It will allow you to collect your information together and then rearrange it in any way you like. The defined block can even be as big as the whole sheet if you wish to duplicate all of your work to date.


The full list of the parts of the worksheet is:

Entry	a single cell.
Column	a vertical band.
Line	a horizontal row.
Block	a rectangle from within the sheet.
All	the whole of the sheet.

You will see later that only a couple of the commands, Blank and Copy, can work on all five options. You will always be reminded which options are available via prompts displayed on the screen.

What to do when you make a mistake

You will always know when you have made a mistake because the spreadsheet will give you a beep and an explanation of your error. It will make sure that whatever mistake you make it will do no harm to your work. Just press the  key to back up the cue to the place before your mistake. The spreadsheet usually checks for a mistake as each key is pressed and so you will rarely have to make long corrections.

If you change your mind about an entry and want to abandon what you are doing just press the  key. This will stop the current entry and return the worksheet to the exact state before you started the entry.

Of course the spreadsheet cannot catch mistakes in your logic that are still legal commands.

Saving your worksheets

When you have typed data into a worksheet it is temporarily stored in the working memory of the spreadsheet program while you are still working on it. To save it so that you can later load it back and continue working on it you must store it in a FILE. The word file is just a computer jargon word which means a stored collection of data. The documents in the word processor are also files but the word "document" is a more meaningful description.

To save information to a file all you need to do is type **(C)(A)(F)name(=)** which means Copy All of the worksheet to a File with name "name". Choose your own file name which can be from 1 to 8 letters long. This is not like the word processor where you can have a 12 character name. The reason may become apparent if you later look at the list of stored worksheet files. You will see that the letters .MEM have been added automatically to the name you gave - possibly making it a full 12 characters long. This is because the spreadsheet only recognises files whose names end with a full stop followed by either MEM, TXT, DAT or DIF - this is explained later.

When you next start the spreadsheet you can select an existing file from the list stored worksheets screen to reload your existing work and carry on. Alternatively, you can select the start a new worksheet option and then use the **(C)(F)** command (Copy File) to load a worksheet file back into the spreadsheet program.

In other programs you might be accustomed to using Save and Load to accomplish the same function. In the Notebook spreadsheet both saving and loading are achieved using different forms of the Copy command.

Leaving the Notebook spreadsheet

If at any time you want to leave the spreadsheet you can either just press **(STOP)** at the main ABCEF... prompt or press **(Q)** to select the Quit command. Your work up to this point will automatically be saved in a file called RESTART.MEM. This file is automatically updated and overwritten every time you use the Quit command or leave by pressing **(STOP)**.

This is an EMERGENCY ONLY save of your work and normally you should copy all your work to file with your own choice of name. Just type **(C)(A)(F)MYWORK(=)** (Copy All of the sheet to a file with the



name MYWORK) and your work will be saved in a file called MYWORK.MEM. This is explained in more detail later on in the manual.


When you next use the spreadsheet, you can select the Restart option at the opening screen to automatically reload the RESTART.MEM file so that you can continue work from where you left off. Alternatively, you can just pick RESTART.MEM from the list of stored worksheets. Remember that RESTART.MEM will be overwritten next time you quit from the spreadsheet.

If a request is made to see the stored files whilst the spreadsheet is being used, only those files whose names have the last four characters .MEM, .TXT, .DAT or .DIF are displayed. When using the word processor, if you look at the list of stored documents you will see the spreadsheet files listed but you won't be able to edit them using the word processor (except .TXT files).

Running the sample worksheets provided

Built into your Notebook are seven example worksheets. They are used throughout this manual to illustrate the operation of the program and you could also use them as the basis of your own work by loading one in, modifying it for the way you want to work and then saving it under a new name.

When you first start, the demonstration files are hidden away in the read only memory of your Notebook so that they do not waste any of the valuable RAM space but you can easily copy them out into RAM, while the spreadsheet is being used, so that they can be worked on. From the very opening menu of the spreadsheet choose the "Demos" command by pressing  . After this the example files will be listed and can then be loaded into the program. When you stop using the spreadsheet the example files will be deleted from RAM to conserve space.

To look at the file called SALES.MEM notice that a Copy command has already been started so you just need to type SALES  to complete copying the file and you will then see it on the screen. (You don't need to type .MEM as that is added for you automatically).

SALES.MEM is a sample commission calculation showing the results based on a stepping scale and a sliding scale.

TAX.MEM is an example of a self employed tax calculation. This uses a function POS specially created for tax calculations. This makes no change if the argument is positive but gives a value of zero if the argument is negative.

ADLIST.MEM is an example of using the spreadsheet to hold a name and address list. The spreadsheet's sorting and searching functions can be used to operate on the data and it is possible to print mailing labels from it - this is explained later in the manual.

TBEAM.MEM shows how an engineer might work out the properties of a Tbeam. With routines like this whole books of formulae and tabulated results can be dispensed with.

IRR.MEM shows how to work out the internal rate of return. The program in this case actively searches for an answer as this is the only way this problem can be solved. This worksheet uses DO and WHILE and several other useful functions. You won't be able to prepare this type of worksheet until you are quite experienced but it does show the level of sophistication to which you can go.

PLOT1.MEM and PLOT2.MEM are worksheets set up for graphics. See the tutorial section that deals with using the Troce command for details of how to use the graphics.

When you leave the spreadsheet program, the demo files are erased from the Notebook's RAM to conserve space. If you really wanted to keep one available then you must save it under a new name before you stop the spreadsheet. Because any sheets called SALES.MEM, TAX.MEM, ADLIST.MEM, TBEAM.MEM, IRR.MEM, PLOT1.MEM or PLOT2.MEM are erased when you leave the spreadsheet you must NEVER use these names yourself or your work will be erased.

New users of the spreadsheet may now like to continue reading Part Two - the Tutorial Guide. The following section is a quick start guide for people who are already familiar with the operation of a spreadsheet program.

SPREADSHEET GUIDE - PART ONE(b)

Quick Start Guide for Experts

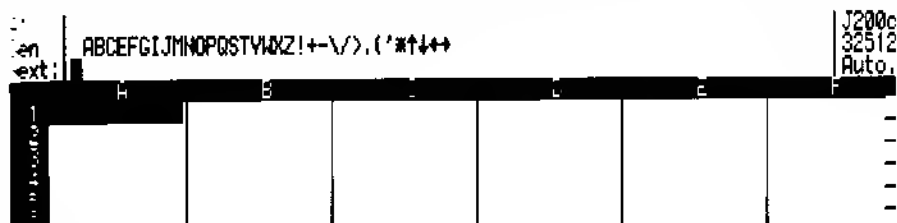
For those of you who are too impatient to take each step in turn or who have to get on with an important job here is the Notebook spreadsheet Quick start guide to fundamental tasks.

Starting a new sheet - the quick way

Step 1

From the opening screen of the spreadsheet select the Make blank sheet command. Notice that when you press **M** the whole command **Make a blank worksheet** appears on the entry line. You do not have to type the whole word. All commands work in this way so, with the minimum amount of typing you can ask the spreadsheet to perform quite complex operations.

The make blank sheet command will start a pre-defined worksheet that has 10 columns and 200 lines made up of cells that all have a General numeric format and which display 12 characters:



Step 2

That's all there is to it. You could now continue with Step 6 in the following description which explains the fundamentals of entering data into your blank worksheet.

This method has allowed you to start a worksheet very quickly. However, there is a limitation to this method of starting a new sheet. The problem is that all the decisions of How many columns? How many lines? What width are the cells? What format are the cells? are made for you. Often you will want to set up a sheet which has more or fewer columns/lines, you might want some that are wider

and some thinner and you may want some in different formats (such as text for odding labels). In this case you should use the following method:

Starting a new sheet

Step 1

Begin by defining your worksheet. Press **[I]** which selects the Insert command to insert between 1 to 52 Columns.

Next: Insert Column, 0-9

Press [Menu] For help anytime

Notice that as soon as you type **[I]** the whole word **Insert** appears and the line above shows that you can either type the letter C to mean a single column or you can enter one or two digits between 0 and 9 if you want to create a number of columns. Type **6C** to mean "6 columns":

Next: With width 0-9, ↓

Press [Menu] For help anytime

Step 2

Now you must specify the display width of the columns, 1 to 67 characters. New ones can be added at any time and the width of existing columns can be changed. Notice that you can either enter a digit or the **↓** means you should then press the **[↓]** key. Type **10** **[↓]** to specify that the columns should have a displayed width of 10 characters. You then see:

Next: Default Format to be 0-9, Carr, General, Heading, Integer, Text, Plot

Press [Menu] For help anytime

Step 3

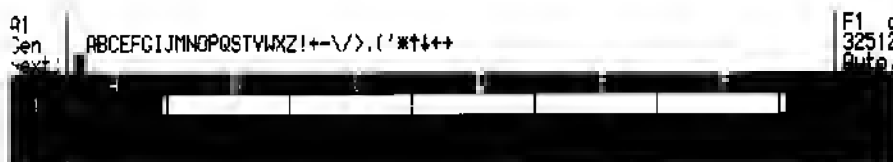
You are asked to specify the default display format for the column(s). The most important choice is between text and numeric formats - text is specified as TL (left justified), TR (right justified) or Heading (always displayed in full despite the column width).

Numeric formats are every other choice except Carriage Returns (Carr).

Formats do not actually alter the data you enter, just the way it is displayed. However, you can only enter text into cells that have one of the text formats and numeric data and expressions into the cells that have one of the numeric formats.

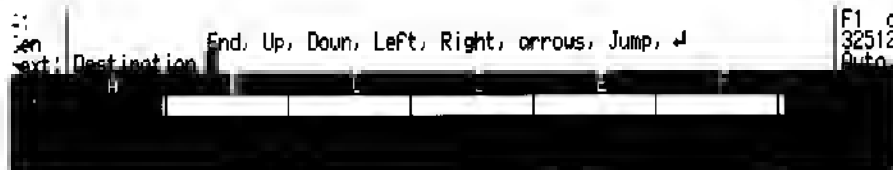
A full explanation of Formats is given in the tutorials and command reference section.

For now just type ☐ to select General numeric format. When you press ☐ you will see a single line with 6 columns, each 10 characters wide:



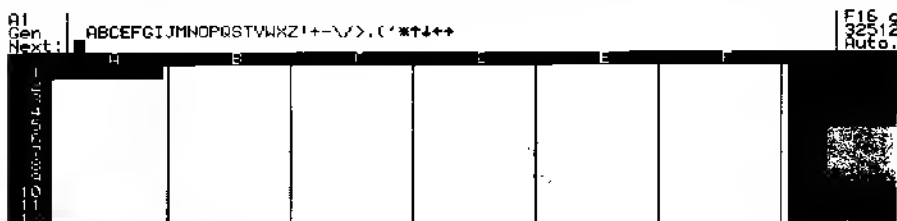
Step 4

So far you have a single line of 6 cells. To make a complete worksheet you need to insert several copies of the line you have already specified. Press command key ☐ again to select Insert. This time, type 15 ☐ ☐ to say that you want 15 more lines. You can have between 1 and 255 lines:



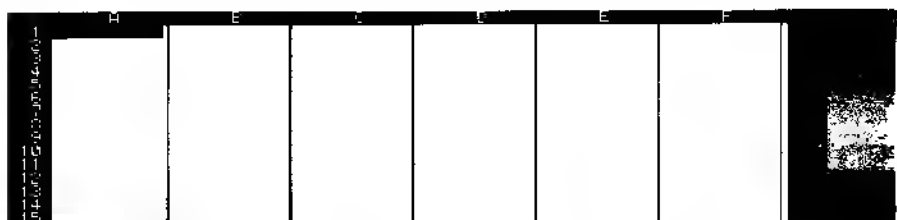
Step 5

When asked for destination just hit ☐ so that the new lines are inserted before (above) the current cursor position. When you already have some lines set up and then use ☐ to insert more, they will always be added before the cursor if you just hit ☐ when asked for a destination:



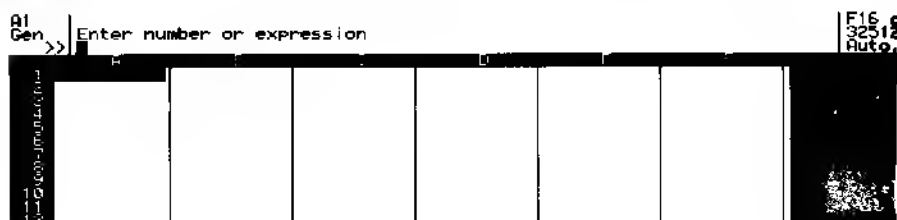
Step 6

Use the cursor keys to move around the sheet. You can also use ☐ and ☐ to move forwards and backwards a page at a time. If you try to move past the edge of the sheet you will hear a beep and see the message **outside worksheet**. Just press any key to clear this message from the screen. Press ☐ to switch between the normal and enlarged views of the sheet.



Step 7

Switch back to the normal view, now you can try entering your first data onto the worksheet. Press the ☐ key to start entering data:



You will be expected to enter data of a type that is correct for the

current cell format. As all cells have the General numeric format you should type some numbers. If you were entering a lot of data you would not press the \rightarrow key when finished but, instead, use the arrow keys to move to the next cell and you will remain in Entry mode.

As well as entering just numbers into cells you can also enter formulae that operate on data held in other cells. So, for example, if you have entered 2 into cell A1 you could enter $A1+2$ into cell B1 and the number actually displayed on the worksheet display would be 4 - the result of adding 2 to the contents of cell A1. If you then changed A1 the result would be reflected in B1.

A full list of the functions, mathematical and otherwise, that can be included in a numerical data entry is given in the Expression Entry Section in the Complete Command Summary. Worked examples of many of them are included in the tutorials.

Individual cell formats can be specified using the F for Format command. So, for example, in the sheet you have set up, all the cells are in general format. If you wanted to enter a value and have it displayed in a format with 2 decimal places you could type $2.00 \rightarrow$ followed by the number to enter.

Loading an existing worksheet

Step 1

If you want to load in one of the demonstration files built into the Notebook just press \rightarrow at the opening menu, to select demos, followed by the name of one of the files listed:



Step 2

If you want to load an existing MEM file use the command $[F]name$ to load in the file. As you will see, CF means Copy Filename. When you type the command you will see all files that

could be loaded listed at the bottom of the screen. Just type the name of any one of these. If its name ends in .MEM you do not need to type the .MEM at the end of the name as this is assumed if you do not type an extension.



If you are loading a file with the extension .DAT, .DIF or .TXT you should first define an empty sheet big enough to hold the data. The cells should be defined with the correct format to hold the data loaded from the file.

Only those four filename extensions are recognised. The Notebook spreadsheet expects each filename type to hold a certain type of data - do not use them indiscriminately. When in doubt use the MEM extension. If no extension is used .MEM is assumed.

A file can be added on to one already in memory, if there is room, using the CF command. You will be asked to specify where the file is to go.

Saving a sheet

Step 1

Decide whether you want to save the whole sheet or just part of it. If you want to save a part you will have to specify the cell, line, row, or block that you want to save to a file in memory.

Step 2

Use the Copy All (or named part) to File filename command sequence to save the sheet. You do this by typing **(C)(A)(F)name:**

A1	Mileage								1254c
TextL									32356
Next:	Copy all -	Destination	Filename	MILEAGE					Auto
	Mileage	2500		Miles per L	7.49				
	MPG	34		Litres used	333.82				
	Price per L	47		Total Cost	156.90				

Use the filename extension .MEM (or no extension) if you want to save the data for re-loading into the Notebook spreadsheet. Use

the .DIF extension for loading into another spreadsheet or graphics program if you intend to transfer the file to a different computer.

Use the TXT or DAT extensions for loading into a word processor or for processing by BASIC or other programming language either in the Notebook or perhaps on another computer.

Step 3

If you get the message Memory Full then press **Stop**. All your work up to this point can be saved but you cannot add any more data to the worksheet. Consider breaking it into sections. You may also find it useful to increase the Notebook's memory by adding a PCMCIA SRAM card.

Printing from the spreadsheet

Step 1

Decide what area of the sheet, if not all, that you want to print.

Step 2

If the width of lines is wider than your printer can manage print the sheet in two or more sections.

Alternatively use the OUT command to select condensed print (if your printer is capable of it). See the description of Out In Tutorial X for more information.

Step 3

Use the Copy All (or specified section) to Printer command to print the data. You type **(C)(^)(P)(x)** to do this:

1	Mileage					12540
2	MPG	34				32356
3	Price per L	47				Auto.
4						
5						
6						
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Data is printed as it appears on screen, without line dividers or system messages.

SPREADSHEET GUIDE - PART TWO

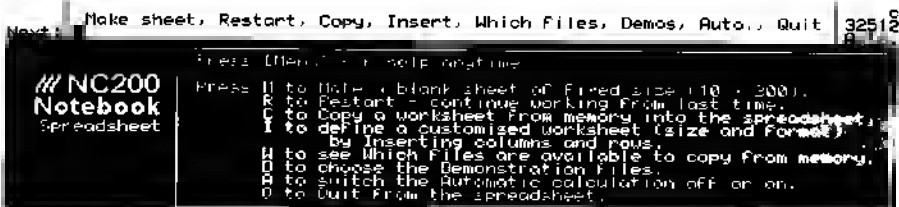
Complete TUTORIAL Guide

The following tutorial chapters work up from the most basic things you will need to know to start using the spreadsheet to some very advanced topics. As well as explaining the use of many of the commands that are covered in the complete command reference it also, by example, shows some uses to which the spreadsheet can be put.

Tutorial I - Basic Techniques

Creating a worksheet

This is the picture you will have on your screen after first starting the Notebook spreadsheet if you select the Start a new worksheet option.



To get started as quickly as possible we will leave a description of building a sheet from scratch until later in the manual. For the time being just press **[M]** to select the Make sheet option. When you press **[↵]** a blank sheet with 10 columns and 200 lines will be defined. This is made up of cells that are 12 characters wide and have their format type set to General.

You will notice that it was only necessary to type **[M]** followed by **[↵]** to use the Make sheet option. You did not have to type the whole "Make sheet" command. The single key-stroke sequence used by the spreadsheet to symbolise each of the available commands should be extremely convenient to use but you must remember not to try type in the commands in full or some unexpected effects or error messages may appear. A similar form of prompting is used in a lot of computer program. They are

normally referred to as menus, i.e. a list from which you make your selection.

When you are typing commands, if you make a mistake, just press the **[Esc]** key and you will go back to the stage before your error. If you want to abandon the sequence entirely press the **[Stop]** key and you will be returned to the previous menu. No harm will be done.

The numbers that you now see running down the screen are the worksheet line numbers and the A..F above them are the worksheet column letters. The columns across and the rows down have divided the sheet into a grid. Each individual unit of this grid is called a CELL.

The cell cursor is shown as a cell printed in inverse text (currently the top cell in column A). This cell cursor marks the currently active cell which is where many of the commands you type in will take effect.

Each cell has a name, or co-ordinate reference, which you get by combining the column letter and the line number. At the moment the cursor is in column A and line 1 so the co-ordinate reference is A1. As this is the active cell you will see this co-ordinate displayed at the top left of the screen. The "Gen" below this tells you that the cell has a General format. This means that any number entered into it will be displayed in a general format - rather like you might see on a scientific calculator.

The active cell is the cell that is ready for you to enter data into it. Do this now by pressing the **[F2]** key which signals to the spreadsheet that you want to type in some information. Type a few figures followed by **[Enter]** and you will see your data appear in the active cell. In fact, if you want to enter numbers you don't even need to be **[F2]** to start entry. Just start to type a number and the spreadsheet will automatically switch into entry mode. However, when you want to enter functions and formulae, you must start the entry with **[F2]**.


Now moving the cell cursor about using the arrow keys and entering data into other cells. If you have had enough for one session use the **[Stop]** or **Quit** options to leave the spreadsheet. Either press the **[Stop]** key or type **[Q]** to select the Quit command. They have the same effect.


Tutorial II - Inserting and Deleting Rows and Columns

Now that you have had your first experience at using the sheet it is time to look more closely at the commands used for creating, and deleting parts of, a spreadsheet.

To get started quickly in the first tutorial we just used the Make sheet command which made a blank sheet of predetermined size and type. As an alternative you could have started from scratch using the Insert command to build up columns and lines of whatever size and type you desired.

Having defined a sheet of a certain size it is also important to be able to remove unwanted parts of the grid. For this we use the Zap command.


The Insert and delete (Zap) commands act on rows or columns, either one at a time or in groups. If you still have a worksheet on screen from the previous section, clear anything you have done so far with  i.e. 'Zap All'. Note that the spreadsheet asks for confirmation before proceeding with this possibly disastrous command. You will return to the opening screen of the spreadsheet.

If you had already left the spreadsheet then select the **Start a new Worksheet** option. This time, instead of using  we will see how a sheet may be built up from scratch.

By choosing to build a worksheet in this way you have complete control over exactly how many columns and rows there are, how wide the columns are, what type of data they should contain and exactly how it should be displayed.

Now type  10 for 'Insert Column of width 10':



When you press  you are then asked to give a default format for the column:

0-9, Carr, General, Heading, Integer, Text, Plot | A1 C
 32512
 Auto.
 text: Default Format to be |
 Press [Menu] for help anytime

Each new column you create will have its own default format, i.e. every single cell in the column is regarded as holding the same type of data (numbers or text) that is to be displayed in the same way unless you specify otherwise. You will learn about formats later, for now in response to the 'Default format to be' prompt type [C] for General:

So far you only have a single cell so next try entering some extra lines with [I]15 for Insert 15 Lines. You are then asked for a destination:

End, Up, Down, Left, Right, arrows, Jump, | A1 C
 32512
 Auto.
 text: Destination |

as well as asking WHAT you want to add to the grid the spreadsheet also needs to know WHERE you want to put it so it prompted you for the Destination of the inserted lines.

if you just type [Up] when asked for this destination the new lines are put in front of the cursor. Your only alternative at this stage when only one line exists is [End] for End in which case it will be put after the cursor. When you have a more complex sheet already defined there will be more possible options and you can insert new lines into the middle of the ones already defined. For now just type [Up] which will put the new lines above the current cell:

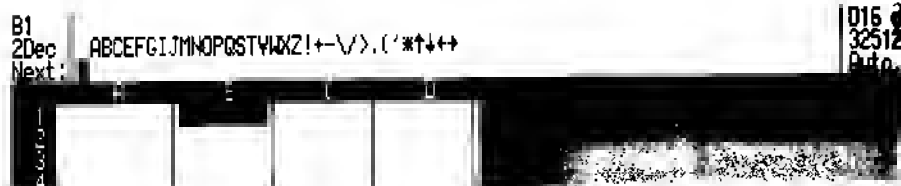
ABCEFGIJMNOQSTVWXZ!+-\>.('*↑++ | A16 C
 32512
 Auto.
 text: |

By inserting columns and rows in this way you can build the spreadsheet up to a possible maximum of 52 columns and 255 lines. The actual limitation on size will be dependent on the amount of free memory available in your Notebook. The spreadsheet is designed to use absolutely the minimum memory and so only those cells which are occupied with data use any memory at all. You can

therefore start with as big a sheet as you like and fill in the details later. If you have used other spreadsheets you will appreciate the difference.

You can use the $\left[\text{F} \right]$ key for Zap command to reduce the sheet by column, by line or as a whole (i.e. a clean start) with the ALL option. You will get more information about these later.

Now type the following command $\left[\text{F} \right] 3 \left[\text{C} \right] 8 \left[\text{E} \right] \left[\text{F} \right] 2 \left[\text{D} \right] \left[\text{F} \right]$. This will insert 3 columns with a width of 8 characters each to be placed at the end (i.e. to the right) of the current sheet. All the new cells will have a format of 2 decimal places.



Moving around the sheet

Try moving the cell cursor around the sheet you have created by typing $\left[\text{D} \right]$ for down. Note that the active cell co-ordinate at the top changes as the cursor moves down. Move the cursor back up again with $\left[\text{U} \right]$ for up.

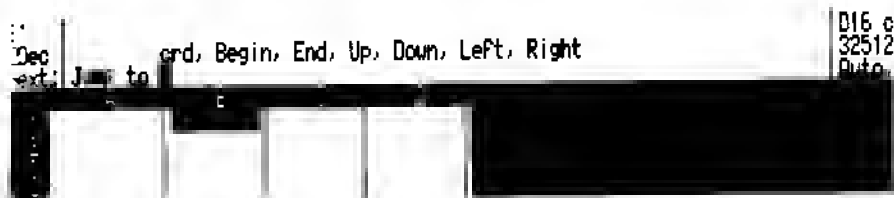
The arrow keys are probably the most natural keys to use to move the cursor but you will find that $\left[\text{U} \right] \left[\text{D} \right] \left[\text{L} \right] \left[\text{R} \right]$ can also be used to go Up, Down, Left and Right. These options exist so that you can use the direction movement keys in macros. This is described later.

Alternatively, if you prefer to use direction movement keys laid out in a diamond shaped cluster you can use the $\left[\text{W} \right] \left[\text{A} \right] \left[\text{P} \right] \left[\text{O} \right]$ keys - pressing them with $\left[\text{Ctrl} \right]$. The positioning of these keys corresponds to the direction they move in.



The following were explained in the Getting Started part of this guide and are repeated here for your convenience:






[F], U, [Control]-W	cursor up
[Down Arrow], D, [Control]-Z	cursor down
[Left Arrow], L, [Control]-A	cursor left
[Right Arrow], R, [Control]-D	cursor right
[Up Arrow] [Page Up] or -	Move up a page
[Down Arrow] [Page Down] or +	Move down a page
[Up Arrow] [Word Left]	jump to left edge on current line
[Up Arrow] [Word Right]	jump to right edge on current line
[Control] [Page Up]	jump to top cell in current column
[Control] [Page Down]	jump to bottom cell in current column
[Control] [Word Left]	jump to cell at top left of defined worksheet
[Control] [Word Right]	jump to cell at bottom right of defined worksheet.

• you have to move the cursor to a specific cell you may find it easiest to use the Jump command. This command goes directly to the co-ordinate that you specify. Type [J] and you will see:



The "crd" in this prompt means that you can specify a co-ordinate as the destination for the jump. Type D6[Right Arrow] to move to the cell at the bottom right of the sheet. If you just received the message "No such column" this is because you typed Jd6, rather than JD6 - remember that the first 26 columns are labelled with the upper case letters so you must use D, not d.


There are six other possible jump destinations - Begin and End, which refer to long jumps to the very beginning (top left) and very end (bottom right) of your worksheet. Right and Left go to the very end and beginning of the current line and Up and Down go to the top or bottom of the current column. Some of the  and  + arrow key commands actually call these forms of the Jump command and you may find it easier to use those but the Jump command has the advantage that it always reminds you what the possible jumps are.



Now use  to move the cursor to column A, line 1 (that is, cell A1) and press  to start entering a number. Type 37, when you hit  you will see the number you entered displayed in the active cell. Now move the cursor right into one of the three columns that were created with a format set to 2 decimal places. Enter the same number in one of these. Once again you see the number displayed but there will be 2 places after the decimal point shown in the cell. This is because columns B to D have their display format set to two decimal places. Notice that the status information at the start of the second display line says "2Dec". In column A it was "Gen" which shows that it has a general display format.

A note on destinations

When using Insert you will notice that columns can be inserted on either side of the current column using either the left or right arrow keys. Other options are at the beginning and end of the sheet. When you are inserting any lines or columns you will be prompted with this range of options for the Destination:

End, Up, Down, Left, Right, arrows, Jump, J

Of these options UDLR, arrows and J all serve to move the current cursor position to the point where you want the new line/column to be inserted. When you have the cursor positioned where you want it in the sheet use the  key to make the insertion.

A new column will be inserted to the left of the column containing the cursor when  is pressed. A new line will be inserted above the line containing the cursor when  is pressed.

End is a special command that simply tells the spreadsheet to tack on a new line or column at the End borders of the current sheet i.e.

Columns are added to the right of the sheet, lines are added to the bottom.

When inserting a line or column, the cursor is positioned in the new line or column ready for the insertion of data.

More on Entering Data

Clear any numbers you have entered so far by typing $\boxed{\text{A}}\boxed{\leftarrow}\boxed{\text{B}}\boxed{\leftarrow}$. This uses a new command, Blank, to clear data from occupied cells but leave the empty cells behind. This is similar to the Zap command except that Zap also removes the empty cells. If the cursor isn't there already, type $\boxed{\text{A}}\boxed{\text{B}}\boxed{\leftarrow}$ to jump to the beginning of the sheet (cell A1).

As you have seen, when you type $\boxed{\leftarrow}$ the screen will change to show this prompt:

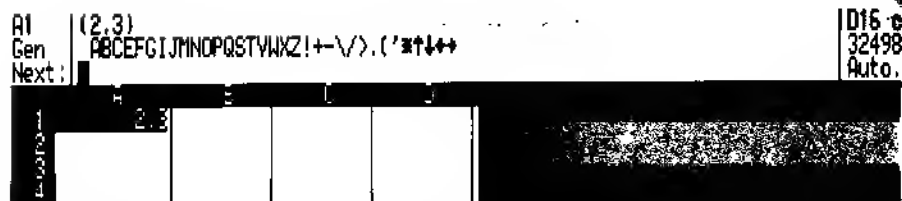


This is called entry mode and as you have already seen, the spreadsheet is now ready to accept some form of data. This can either be text, a number or an expression. These are the three types of entry that are possible. The possibilities open to you are determined by the broad choice of format type you have made, e. between a format suitable for text or one suitable for numbers.

You can use > instead of $\boxed{\leftarrow}$ to start entering data if you prefer. The two are exactly equivalent. There are other keys that can be used to start data entry that are described in Tutorial III.

The amount of data that can be entered into a cell is limited by the width of the Entry line - 67 characters.

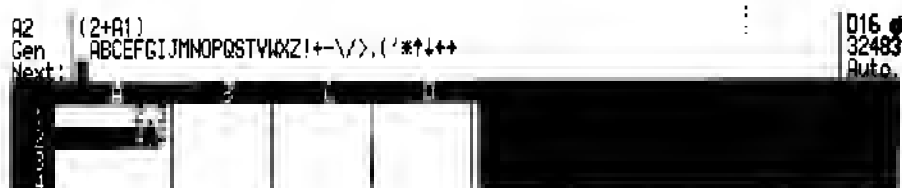
The worksheet we have defined so far has only used formats suitable for numeric data - General and 2 decimal places. The prompt you receive will reflect this. Try it now, enter a number 2.3 and press $\boxed{\leftarrow}$. If you make a mistake, press the $\boxed{\leftarrow}$ key and the cue will backspace removing the last character you typed. Your screen will look like this:



Note that the contents line of the top now has your entry enclosed in parentheses - (2.3). The brackets are an indication that the entry is a number or expression. You will see later that if it had been an expression the contents line would show exactly what you had typed but the worksheet display would only show the calculated result.

Note also that the memory, shown by the figure at the end of the second display line, has gone down a little.

You are next going to see the power of the spreadsheet. Move the cell cursor down with the **↓** key and press **⏏** again. This time enter **2+A1**, which is an expression meaning '2 plus the current value at co-ordinate A1'. Remember to type the A in upper case. You will now see:













Note that the RESULT has been calculated and shown in the display.

Go back to A1, select entry mode again and enter a new value of 3.7. When you press **⏏** you will note that A2 changes at the same time. You have managed to enter an expression that uses a value from another cell and this expression works, however, you change that cell value. The same principle can be extended to operate over the most complex of worksheets and formulae.

Note that although the sheet display shows the RESULTS of the formula you enter, the contents line still shows the expression that you entered in the brackets. Move the cursor back to A2 and notice that although the cell in the worksheet is displaying 5.7, the contents line shows (2+A1).






Note also how easy it is to alter an existing cell entry by just typing in a new value.

One thing you may find useful is that if you use the arrow keys to move the cursor while in the process of entering text or expressions then it will finish off that entry and move the cursor to the cell in the direction you have specified. This cell will be set up ready for you to make your next entry. The cell format will be set up to be exactly the same as the previous entry.


The use of arrows in this way can save much time with long lists as the one key stroke is equivalent to , cursor movement and  for entry. Obviously the     keys cannot be used in this case since the spreadsheet cannot tell whether or not you are intending to enter some text, a cell reference or a function name. You can, however, use     if you prefer.

By changing a single value a huge number of other cells that are dependent on it will all change at the same time. In this way the Notebook spreadsheet gives you the power to test the effect of different values on an answer and so do 'What if?' assessments of a situation.

Entering Text

Now you are going to create another column and insert some text instead of a number. With the cursor still in column A, type  20    . Some of these commands we have met before. The TL command is the default format for the column we have created. T stands for Text which tells the spreadsheet what type of information to expect. L stands for Left justified which just means print the text from the left hand edge of the active cell.

Column A is now set up for you to put in the text. Note that the original column has been shifted to the right and labelled B. This again shows how easy it is to alter the dimensions of your worksheet grid at any time.

Before you go any further, use the  key to move the cursor to location B2 which contains the expression we have already typed in. If you look at the top line of the screen you will see that the A1 which you have typed in has now changed to B1 to keep track of the effect of entering another column. You can rest assured that your expression will still work the way you intended it to.

E16
32483
Auto.

At
Text | Enter characters

E16 0
32483
Auto.

The Entry Line will display a marker (the vertical line just above the column B label) that reminds you of the current display width for the cell, but this can be exceeded - the actual amount of data that can be entered is only limited by the width of the Entry line.

A1	First Number
TxtL	ABCEFGIJKLMNOPQSTVWXYZ!+-\>.('*↑++
Next	

E16
3247
Auto

Recap:

Now look at this list to remind yourself of some of the features you have seen so far.



is used from the opening screen to quickly make a blank sheet.



is used to insert columns and lines. You have to say how wide any new columns will be and what type of format they should have.



moves the cell cursor up.



moves the cell cursor down.



moves the cell cursor left.



moves the cell cursor right



Is used to jump to a particular cell.



allows you to enter a number, expression or text.



is used to accept and complete a command.



press this key to abandon the current operation, without harm.



use this key to backspace and correct mistakes while entering data or commands.

A1,A2

are cell co-ordinates and may be used if they are numbers in an expression.

You have now tried both expression entry and text entry. The choice of whether text or number is to be entered depends on what format the cell was given when it was created.

You have also seen that the same number entered into cells with different formats is displayed differently.

Tutorial III - More advanced techniques

Understanding the difference between text and numbers

You will have seen already that the data that has been entered can be displayed in a variety of different ways, as defined by the current format.

There are about a dozen built in formats that can be used but they divide into two broad types, some relating to text and some relating to numeric data. It is possible to switch formats as long as the cell is empty (using the Format command) or the data within a given cell can conform to the new type (using the New Format command).

For example you can switch a number between Integer format, which only displays the whole number part of a value, to a Financial format, which displays data correct to two decimal places. It does not make sense to try and switch Text to an Integer format for example and the spreadsheet will catch any attempt to do so during the entry process. Although you might think that it should be possible to switch a number or expression to a text format this is not possible.

Text data cannot be processed to a numeric value; you could enter a mathematical expression into a cell that is expecting text data but you would not get a numerical answer. This is an important distinction for you to grasp. If for example you enter $23+23$ into a numerical cell the spreadsheet will realise that it is expected to work out the answer and display 46. Entering exactly the same thing into a text cell will simply cause "23+23" to be displayed in the cell.

Text is used for headings, explanatory labels or for information in a database such as names and addresses. The Notebook spreadsheet assumes that you may want to enter numbers and formulae into these cells as part of an explanation of the surrounding sheet so no attempt is made to calculate using these values.

Text data can NOT be entered into a cell that has been set up with a numeric format.

It is possible to use the EDIT command (described later) to change data to the wrong format but you will find that the error will be pointed out to you as soon as you leave the Edit mode. Pressing the [F2] key will return you to edit mode to correct your mistakes.

Data can be assigned to an incorrectly formatted cell if it has been loaded in from a stored file onto an existing sheet. However, any attempt at performing a calculation on the data will throw up the error.

Using Ranges

Certain of the Notebook spreadsheet's built in functions and expressions work on a specified range or column of the data. For example to AVERAGE some of the data you would specify the range thus

AVERAGE (B1...B10)

When you type this in you only actually type a single . and it is automatically expanded to Any blank cells are ignored in the above calculation. This saves you from having to create unnecessarily complicated expressions in order to encompass all of the data required. However, if an occupied, text format cell is included in the range you will see the error **Text reference in an expression.**

Formats: changing the way the data is displayed

You will remember that the format does not affect the actual data value that a cell holds, just the way it is displayed on screen. You can therefore change a numeric cell from decimal format to integer and back again without losing any precision of the data. Whilst you are moving around the sheet the contents line at the top of the screen will always show the data or expression of the current cell exactly as it was originally entered, regardless of the current format.

So far you have only seen the General and 2 decimal place format in expressions and TL (Text Left justified) for text.

If you are still unclear about what is meant by changing the type of display format, consider this example. If you have a number such as 2 there are several ways you could write it down such as 2, 2.0, 2.000, 0.2E1.

All are perfectly valid but not all are as you would want for presentation in a report, or for immediate legibility. If it was referring to a whole number of items you would want 2. If it was the amount of money you would want 2.00. If it was a laboratory test result you may want to infer a precision to the nearest 0.1 by using 2.0.

Just in case you don't know 0.2E1 is known as "exponential" or "scientific" notation and means 0.2×10^1 . This is just another way of entering and displaying numbers. This is often used when representing particularly big or small numbers. It is far easier to work with 0.3825E14 than 38250000000000 !

You can produce any of the above layouts using the various formats available with the Notebook spreadsheet. The full list of available numerical format types is:

Gen	General, rather like a scientific calculator
#Fin	Finance, balance sheet format (# is number of places to shift by)
#Dec	Decimal places specified (# is number of places to be displayed)
#Exp	Exponent scientific notation (# is number of significant figures)
Int	Integer, nearest whole number
Plot	Plot format, horizontal bar graph

Text formats can be:

TxtL	text left justified
TxtR	text right justified
Head	heading

Careful use of the format options can help to produce some quite sophisticated printouts. Notice that as you move around the sheet the start at the second display line always shows the format type

of the current cell using a 3 or 4 letter code as described in the list of formats above.

There is also a format choice of Carriage Return that can be assigned to individual Cells or ranges. This is a special format used to control printout in such a way that address labels can be produced. No data can actually be entered in cells that have this format. When printed, cells with this format cause a new line to be started on the printer.

If you use Insert to create new columns you are asked to give the cells you are creating a default column format type. If you select any of the numeric formats then subsequent use of [F2] to enter data will ask you to enter a number or mathematical expression. If, on the other hand, the cells were created with a default column text format then using [F2] will ask you to enter characters.


The [F2] command starts data input using the current default column format. However, you may wish to over-ride this for entering just single pieces of data. There are several ways to do this.

If you start data entry by typing the [F2] (Format) command you will first be asked the exact format to be used for that particular cell and will then be invited to enter the corresponding data.




If, instead of [F2], you start data entry by typing # (this always means that you want to enter a number/expression, rather than a piece of text, even if the cell was created with a text format. In this case you are not asked to specify the exact format to be used. Instead, the Default Global Numeric Format is used. When you first start the spreadsheet this is set to be General format. You can use the NG (New Global format) command to change the default global format. This is explained later.

If, on the other hand, you start data entry by typing a quote character (either ' or ") the spreadsheet will assume you want to enter a piece of text even if the current cell was initially created to have a numeric format. This uses the Default Global Text Format which is initially set to Text Left justified.

You may also change the default format used in a column when the [F2] command is used. This is done with the ND (New Default format) command. If some cells are already occupied and have associated formats they will not change but any data subsequently

entered into blank cells in the column using  will take on the newly set default column format.


More on Numeric formats

You can now experiment with some different formats. Go to cell A2 (which is in a column with Text Left format) and type    which means 'make this cell General Format and start data entry'.

A2 TxtL Enter number or expression E16 c
32478
Auto.

1	First Number	3.7				
2		5.7				

Because you have chosen a numeric format the type of prompt you will receive will reflect this i.e. Enter number or expression.


Type 2.312 :

A2 Gen (2.312) E16 c
32454
Auto.

Next: ABCDEFGIJMNOPOSTVWXZ!+-\>.('*†‡++

1	First Number	3.7				
2	2.312	5.7				

You will see that your value of 2.312 is displayed just as you typed it in.


The  for Format command should only be used on cells where you wish to change both the format and the data contained. It is also possible to change just the format of an existing entry without having to re-enter the data. Without moving the cell cursor type the following and watch the changes.

Type   4   for 'New Format to be 4 places Decimol':

A2 4Dec (2.312) E16 c
32454
Auto.

Next: ABCDEFGIJMNOPOSTVWXZ!+-\>.('*†‡++

1	First Number	3.7				
2	2.312	5.7				





came from the default column format if you use the  command. The default column format is that which you specified when the column was inserted or when you used the ND command. Entered data may take on the global numeric or global text format if you start entry of the data with (or " respectively.

Because a format is associated with a piece of data rather than a cell you cannot use the NF (New Format) command on a cell that has not yet had a piece of data entered into it. You also find that if you move or copy data the data takes its format with it to the new location.

Text Formats

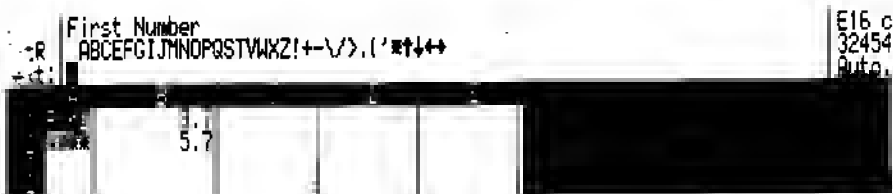
There are two normal types of text display. Justified in the column width is the first type. This has two subdivisions - you can specify that you want the text to be left justified (it hugs the left hand side of the column) or right justified (it hugs the right hand side of the column).

The second type of text entry is Heading. This type will overwrite the column(s) to the right if there is not enough space to display all of the information in the single cell. As the name suggests this is most useful when entering explanatory titles or headings that you want to be displayed regardless of any changes in the various column widths on screen.

The entry in cell A1, **First Number**, is currently shown in text left justified format as this is the default format of column A. Move the cursor to cell A1 then type , which stands for 'New Format Text Right justified' to see the effect of changing the format to right justification without losing the data.

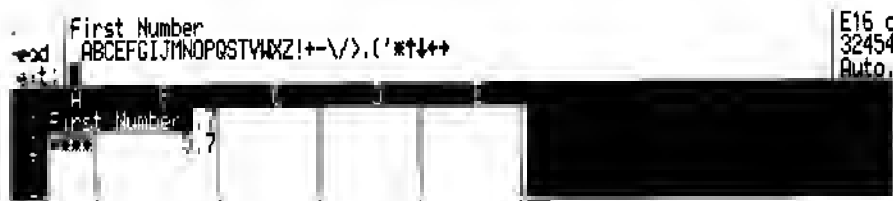
A1	First Number	E16
Text	ABCEFGIJMNPQRSTVWXZ!+-\/>.('*†‡↕↔	Auto
Next		
	First Number	
	5.7	

Before investigating Heading format you are going to change the column width. Type **N W 4** which stands for 'New Width 4'.



You should note that only the start of the word "first" can be displayed in the available space now that we have made the column much narrower. The whole entry is still there in the worksheet memory as you can see by looking at the contents line at the top.

If you type **N F (4)** for 'New Format Heading' you will see:



The whole of **First Number** is again displayed and part of it overwrites cell B2.

cap:

We have learnt that data falls into two broad subdivisions, text and numeric. We have then looked at some of the format subdivisions within those two types that control the way the data is displayed on screen.

You have seen that it is only what is displayed that changes. The true value that you originally entered is always stored and used in calculations - however you choose to display the result.

You have seen that when entering data into a cell one of several different formats may be used. The column format (set when the column was created) is used if you start data input with **=**. A specific format of your choice is used if you start data input with the **;** command. A global numeric format is used if you start data input with **(** and a global text format is used if you start data input with **"** or **'**.

Tutorial IV

More on changing column widths and formats

You have already used the New command several times to change the column width and to change the format of an entry. It can also be used to change the default column format. The default column format is the format that will always be used in your current column if you do not declare a particular one before each entry. You enter data using this type of format by starting with the `[>]` command.

The last item that may be changed is the global format. Despite the singular name this is a pre-set pair of formats, one for text and the other for numeric values, that may be used anywhere on your worksheet and which are quicker to call up than by explicitly stating which format type you require - they are time saving devices. You can call these formats instantly by using the `(` command for numerical expressions and the `'` or `"` command for text. At start-up these formats are set to General for numerical expressions and Text Left Justified.

If the vast majority of your worksheet is likely to use one format then it will be worth your while redefining the Global formats.

If you type `[>][G]` and then a numeric format you will change the default global numeric format, while, if you type `[>][G]` followed by one of the three text formats you will set the default global text format. So the same NG command may be used to set two different global default formats.

The complete set of New commands is:

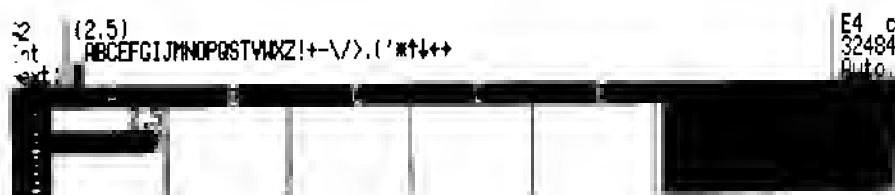
- NW#** New column width
 (# is number of spaces to set width to)
- NF** New format for a cell already containing data
- ND** New default column format
- NG** New global format

You haven't seen the Global format in operation yet and so here are a couple of examples. Type `[2][A][>][G]` to clear any sheet you have loaded, alternatively, start the spreadsheet with the "start

a new worksheet" option. Then type **[5][10][G]** then **[3][G]** to set up a small sheet of general format cells.

Now type **[N][G][3]** to change the global numeric format to integer.

Type **[2.5]** to enter the value into cell A1. It is displayed as '2.5' because it is in general format. Now move to A2 then type **[2.5]** and the number is displayed as '3' because it is in integer format.



The operation is very similar if you want to put text in a column that is set up for a number. This time use the quote to start text entry using the Global text format.

You can use the Global format entry method anywhere on your worksheet. You can, of course, also change the Global text format using the New command.

Remember that you cannot use the New Format command for changing between text and numeric formats. The NF command will only work on an occupied cell because only pieces of data that have been entered actually have a format associated with them which can be changed.

Even if you have managed to get the wrong type of data into a cell, using the Edit command or by loading a file in, you still cannot change the Format between text and numeric in order to suit the data. You will have to rewrite what is there AFTER changing the format.

Recap:

We have seen how the global format can be used to quickly set up cells for a certain data type. This allows the existing column format setting to be over ridden.

Editing

We have seen already how easy it is to replace the contents of a cell with something different.

For most operations you will find that this is the most convenient method to use for making changes. However, sometimes you may wish to make only minor modifications to an existing entry and for long and complex expressions it would be more convenient just to edit the existing information.

If you decide to change an entry without re-entering it you use the spreadsheet's cell editing commands. You just position the cell cursor on the cell you would like to change and type **[F2]**. The current contents of the cell as you originally entered it are displayed on the entry line and you can then amend it as necessary and press **[Enter]** when finished.

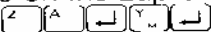
While editing you can type new characters which will be inserted before the cue. You can move the cue along the existing line using the **[Word Left]** and **[Word Right]** keys. Existing characters can be deleted using either of the **[Del]** or **[Backspace]** keys.

At any time before you finally press **[Enter]** you can press the **[Esc]** key. This abandons the changes you have made and retrieves the entry in the form it was before you entered the edit mode.

The important thing to remember when you edit a piece of data in this way (rather than entering it from scratch) is that the automatic error checking is turned off so you can change the value in a cell to something quite ridiculous and it is only when you finally press **[Enter]** to leave the editor that the error will be detected.

Tutorial V

Removing data from the sheet - Blanking and Zapping

Let us recap on the Zap command. So far you have only used the sequence  to remove (Zap) the whole sheet. However, this command also works on specified lines or columns, either individually or collectively. It not only removes the data from the cells in question but also reduces the size of the sheet. The lines or columns that are removed need not be on the outer edges of the sheet.

You are prompted to specify which rows and columns to remove - the remaining cell co-ordinates will automatically adjust themselves to reflect the change.

Cells cannot be zapped if there are other formulae that depend on the data held within. If you try to do so you will be offered the chance to use the BLANK option instead.

If you are sure you want to Zap a column or line that has data dependent on it, as above, you must first find and zap or blank all the cell formulae that depend on the value held in the target cells for their calculation. This is more simply done than it may first seem because the spreadsheet will tell you which are the dependent cells in turn.

Although the Zap command also offers the option of Entry or Block, if you select one of these it will only blank them. It would be impossible to completely remove a single cell (or a block) as this could leave a hole in the middle of the sheet.

In an example you will see how to use some of the other forms of zap command in more detail.

Zap any sheet you are working on with the command `[F2][A][→][Y][←][→]` then copy in the demo file called ADLIST by typing `[F2]ADLIST[→]`.

A1	Init						F17 c
TxtL	ABCEFGIJMNOQRSTUVWXYZ!+-\>.('*†‡++						32247
Next:							Auto.
	A	B	C	D	E	F	
1	Init	Name	No	Road	Town		
2	R.T.	Cowan	16	Jeremy Grove	Hampton	17	
3	G.L.	Blake	37	Osmaston Road	Knowle	56	

Suppose you do not want the top two lines which are just labels. You could remove these by positioning the cursor anywhere in line 1 and typing `[F2]2[→][←]`. Those lines are removed and the original line 3 is moved up to line 1.

A1	R.T.						F15 c
TxtL	ABCEFGIJMNOQRSTUVWXYZ!+-\>.('*†‡++						32272
Next:							Auto.
	A	B	C	D	E	F	
1	R.T.	Cowan	16	Jeremy Grove	Hampton	17	
2	G.L.	Blake	37	Osmaston Road	Knowle	56	
3	R.J.	Hunt	25	Latimer Road	Wythall	43	
4	H.A.	Fisher	32	Florence Road	Henley	28	

This example also demonstrated a feature that is common to many of the spreadsheet commands (zap, blank, copy, move, insert) that you can normally specify a number to say that you wanted it repeated for several columns or lines. This is normally indicated when the prompt offers the option 0-9.

Suppose you wanted to get rid of column F which just contains some numeric values. Move the cursor to column F by pressing `[F2][E][→]`. You can now remove the column with `[F2][E][←]`.

E1	Hampton						E15 c
TxtL	ABCEFGIJMNOQRSTUVWXYZ!+-\>.('*†‡++						32333
Next:							Auto.
	A	B	C	D	E		
1	R.T.	Cowan	16	Jeremy Grove	Hampton		
2	G.L.	Blake	37	Osmaston Road	Knowle		
3	R.J.	Hunt	25	Latimer Road	Wythall		
4	H.A.	Fisher	32	Florence Road	Henley		

Blanking

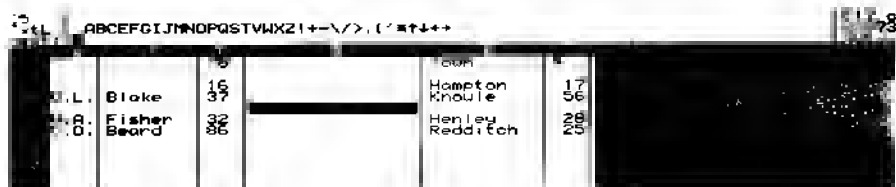
You can use the Blank command to clear all, or parts, of the worksheet. In contrast to the Zap command you will not change the size of the sheet or any of the default settings with this option.

However, individually set commands such as formats will revert to the default column ones.

As an example you will see how to use the blank option in more detail. Get back to the opening menu by zapping the sheet you were working on with the command (Z)(A)(J)(Y)(J) then copy in the demo file called ADLIST again by typing (D)ADLIST(J)

Type (B)(B)A1(B)B3(J) which stands for 'Blank Block in the range A1 to B3'. Note that you are allowed to type a single full stop to specify a range but the Notebook spreadsheet automatically expands this to three for clarity. Remember that the cell co-ordinates must be A1 and B3 in upper case. If you type a1.b3 the spreadsheet would think you meant columns 27 and 28 rather than 1 and 2.

Now blank column D by moving the cursor to any cell in column D and using the command (B)(C)(J). Move the cursor to line 4 and type (B)(L)(J) to blank that line.



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
1																										
2																										
3																										
4																										
5																										
6																										
7																										
8																										
9																										
10																										
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19																										
20																										
21																										
22																										
23																										
24																										
25																										

You will never be allowed to inadvertently destroy the sense of the sheet with the Blank command. If you have an entry like 2*B3 and try to blank B3 the spreadsheet will check and warn you. However, you will be allowed to confirm that you wish to blank the cell. A row of '???' will then appear in that cell at every recalculation to signal to you that some data is missing from the sheet.

Depending on the formulae that refer to the blanked cell you may also trigger other errors such as 'Division by zero'.

You have learned how to reduce the size of the sheet using Zap and how to erase entries using Blank.

Tutorial VI - Expressions

Understanding expressions - the heart of the sheet

We have already looked in brief at entering expressions in the first part of the Tutorial where we just used '2+A1' to add 2 to A1. You will not be surprised to find that there is very much more to expression formulae than that. However, just take it slowly experimenting with each new feature and finding those that suit your particular needs.

A worksheet that contains just numbers and text can be no more useful than a piece of paper; you can enter values that have relationships with each other, but the spreadsheet, like the paper, can't guess what these relationships are or do any of the working out for you. To really exploit the power of a spreadsheet you must get used to entering the relationships between the data, not the results of the relationships, and letting the computer do the calculating.

For example, in a financial report, we may have an entry for yearly income, one for costs and one for profit. We understand that the value that represents profits is worked out as Income minus Costs.

When using the spreadsheet we should enter only the data for income (in cell A1 for example) and for costs (e.g. cell B1), in the third cell we then enter the relationship between these two that represents profits in the form of a formula (A1-B1). The technical term for this formula is an expression.

The power of the spreadsheet lies in the fact that you can enter extremely complex formulae and inter-relationships between the cells, but as soon as you make a change to one entry the full repercussions of it can be calculated and the entire sheet almost instantly updated.

Expressions are at the heart of the spreadsheet, for with them you can do business calculations, as well as scientific and engineering mathematics. An expression is defined as any entry that can be used to calculate a value.

What are the features of an expression? We have said you may

think of it as a mathematical formula. $2+2$ is an expression which should equal 4. $2+A1$ is also an expression which as you have already seen is equal to 2 plus whatever is the value of A1. You can use any of the following mathematical signs, known correctly as OPERATORS:

- + plus
- minus
- * multiply
- / divide
- ^ to the power of
- % percent

The + and - signs you will, of course, be familiar with, but if you are new to computing the symbols *, / and ^ may be unfamiliar. You will always have to use the ^ symbol when you want to get 'to the power of' because super scripts are not available, so for example, instead of using 5^3 you use 5^3 which gives the result 125 ($=5*5*5$). The % symbol is not often used in calculations outside of spreadsheets. It means 'percent' such that $5\%20$ is 5 percent of 20, which equals 1.

You will now see how to enter a formula into a cell. You may already be wondering how to enter the formula on one line when usually they take up 2 or more if written out longhand. This is simply done by splitting the formula into parts and enclosing these in brackets. To show that one part is divided by another we put / between them, so:

$\frac{2+A1}{5+A2}$ becomes $(2+A1)/(5+A2)$

This is a common computing convention and will be familiar to anyone who has used a programming language such as BASIC. If necessary you can have several layers of brackets to avoid ambiguities. If the spreadsheet finds a reference to a cell that does not have a value it will use 0 and the blank cell will show a line of question marks to show that a value is expected. This is a useful feature that allows you to use a range of cells in some functions without worrying whether they all have the correct form of data.

The Notebook spreadsheet works out expressions in normal algebra. This is the algebra you use in hand calculations. Some people with experience in computing may be relieved to hear that the back to front entry method (reverse polish notation) is not used.

The spreadsheet understands the correct order of precedence of the operators during calculation. In general make up formulae as you would for pencil and paper, convert them to one line form and enter them and the result will come out as you intended.

On many spreadsheets there is no built in order of precedence; $1+2/5$ would be worked out to be 0.6, by adding the 1 to 2 before dividing by 5. This is not the correct result, the real answer is 1.4 - that is, divide the 2 by 5 BEFORE adding it to 1 because the division operator has precedence over the addition operator. In spreadsheets that do not have a built in order of precedence you have to take positive action to force a correct result by entering $1+(2/5)$. It is unfortunately easy to get unexpected results, but you will have no such problems when using the Notebook spreadsheet. The order of precedence of calculation is:

- ()
- %
- ^
- * and /
- + and -
- >, < and = these are logical operators.
-], [and !

The Notebook spreadsheet starts the calculation with the innermost brackets. Within the brackets it works out the part of the expression starting with the highest precedence operator. Where there are two operators of equal precedence the one on the left is done first. The next bracket is then done and so on. Do not worry about the details - just make up your expressions in your usual way.

The other item you can use in an expression is a function. This is a built in formula that can be called by a simple name and which will return a value to your expression. The simplest functions are **E** and **PI** which, when used in calculations, give the values 2.71828182845905 and 3.14159265358979 without having to enter them. **PI** is the ratio of a circle's circumference to its diameter. **e** is the base of natural logarithms.

A1	(2*PI)	J200c
Gen	ABCEFGIJMNOPQSTVWXZ!+-\/>.(' * ↑ ↓ ↔	32497
Next:		Auto.
1	6.283185307	-
		-
		-

There are also some functions into which you must first insert a value. An example is **SIN(n)** which means 'work out the sine of *n* degrees'. Note that the value you enter into the function must be enclosed in brackets:

A1	(SIN(30))	J200c
Gen	ABCEFGIJMNOPQSTVWXZ!+-\/>.(' * ↑ ↓ ↔	32494
Next:		Auto.
1	0.5	-
		-
		-

One feature you will find especially useful is that you could have out 2×15 or $4 \times A1$ or any other expression in the brackets part of the function. The part within the brackets is calculated first and then the result is fed to the function. You can even have functions of functions such as **SIN(SIN(30))** and so on. There are no real restrictions except the number of levels of brackets which are limited to five in any one expression.

For example:

A1	(SIN(SIN(30)))	J200c
Gen	ABCEFGIJMNOPQSTVWXZ!+-\/>.(' * ↑ ↓ ↔	32489
Next:		Auto.
1	0.009726538	-
		-
		-

The last type of function is the one which has two or more values enclosed in (). These enclosed values are called arguments. For example, **SUM(n1,n2)** adds all the values separated by commas in the brackets. This function returns a value of $n1+n2$. Try these functions for yourself:

A1	(SUM(2,3))	J200c
Gen	ABCEFGIJMNOPOSTVWXZ!+-\>.('*↑↓++	32493
Next:		Auto.
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

You can have as many parts inside the brackets as you like. Here is an example with three arguments:

A1	(SUM(2,3,4))	J200c
Gen	ABCEFGIJMNOPOSTVWXZ!+-\>.('*↑↓++	32491
Next:		Auto.
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

The values could also be expressions:

A3	(SUM(A1, 2*B1, C3-27))	J200c
Gen	ABCEFGIJMNOPOSTVWXZ!+-\>.('*↑↓++	32442
Next:		Auto.
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

You can see the full list of functions in the Expression Entry section of the command reference further on in the manual.

If you want to enter a function such as SUM(A1,A2,A3,A4) to add the cells from A1 to A4 you can use the shorthand SUM(A1...A4). A1...A4 is a range meaning use all the values between the first co-ordinate and the second. You only have to enter the first full stop and the spreadsheet will add the other two for clarity; you just type **A1** . **A4** (remember upper case!).

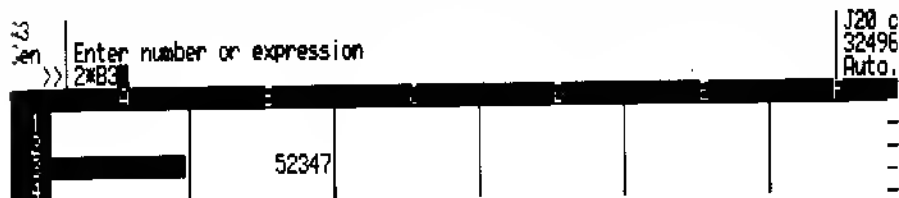
You can even use the function in the form SUM(A1...A4,B7). Use a range anywhere you would otherwise put a list of adjacent entries. For most functions the range will still work if one or more of the

entries is a blank. This is because the functions only work on the non-blank cells.

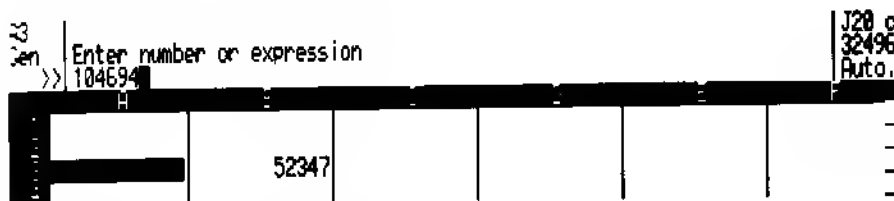
These, then, are what make expressions. There are just two more facilities you might find useful. The first is the # symbol which, when used after you have typed a co-ordinate, puts its value into the worksheet. If you type $2+A1$, # will put the value of A1 into the expression rather than the cell co-ordinate 'A1'. If you type # and A1 is 3 you will find your expression becomes $2+3$.

This means that if you later change the value that is held in cell A1 it will make no difference to your new expression.

The other facility is the ! symbol which forces the expression you are entering to be replaced by its value up to that point. So if you type $2+3!$ the display will immediately convert to 5 and you can continue the entry from that point. If you force a value that includes some cell references e.g. $2*B3$ this is replaced by a numerical constant and the value will not change even if B3 is altered.



When ! is pressed instantly becomes:



Both of these commands have the effect of making the expressions independent of changes in the data held in the cells referred to.

The order of calculation


A powerful feature of the Notebook spreadsheet is that you will find it does not matter where in the worksheet you enter your data or expressions. If you have used other spreadsheets before you will

appreciate the difficulties of getting all your calculations in the right order and avoiding forward references.

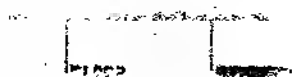
As you enter an expression the Notebook spreadsheet gives it an 'order of calculation number'. This is not affected by where you enter the expression, just by the references in the formula. If you enter $2*B1$ into A3, for example, then you know that you want A3 to be calculated after B1 otherwise it does not make sense. Well, the Notebook spreadsheet goes through all the expressions as you enter them, working out which is the correct order for calculation.

If the entry is a constant then it does not have an 'order of calculation number'.

This feature allows you to rearrange the sheet as you like without affecting your calculated values. The operation is entirely automatic so you don't have to worry about it.

You will be able to see the calculation numbers displayed in angled brackets if you use the  for exchange command. Those cells which contain a low order of calculation number are calculated before those with a high number.

Recap:



We have looked at some of the possible expressions that can be entered into the Notebook spreadsheet. It is these that make it such a powerful tool.

Each expression is assigned a number that tells the spreadsheet which order they should be calculated in.



2000

10

10

Tutorial VII

Mathematical Functions

Here is a more detailed list of the various mathematical functions available. Again, you need not worry about those functions you are unlikely to use.

This tutorial is designed to show you how to use functions in the Notebook spreadsheet and which are available - there will be no attempt to explain the meaning of the mathematical terms available.

Remember, as you read, that arguments are what you put in brackets after the function name and which the function is expected to use to work out its current value.

The usual trigonometric functions are available and there are two versions of each for degrees and radians.

The functions **SIN**, **COS**, **TAN**, **ASIN**, **ACOS** and **ATAN** refer to degrees. Those with **A** in front represent the inverse values of those without.

SINR, **COSR**, **TANR**, **ASINR**, **ACOSR** and **ATANR** are the equivalent functions using radians.

Each function takes just one argument enclosed in brackets.

So that you can see what is going on with this screen example, the expressions in column B have been typed into column A in text form, remember that although the two look the same the text column contains only 'words' which cannot be calculated.

COS(45)	0.707106781186548
TAN(60)	1.73205080756888
ASIN(0.2)	11.5369590328155
ACOS(0.3)	72.5423968762779
ATAN(0.5)	26.565051177078
0.5	
SINR(PI/6)	0.707106781186548
COSR(PI/4)	1.73205080756888
TANR(PI/3)	0.201357920790331
ASINR(0.2)	1.2661036727795
ACOSR(0.3)	0.46364760900806
ATANR(0.5)	

The natural logarithm is referred to as **LN** and the base 10 logarithm is **LOG10**. The natural antilogarithm is defined mathematically as e^x (the exponential constant e multiplied to the power of x) and is referred to as **EXP**.

The equivalent base 10 antilogarithm must be obtained by using 10^x where x is the value for which you want the antilogarithm.

The exponential constant e is available as a function without an argument **e** (lower case is essential when you type this). Similarly **PI** is available.

The square root is called with **SQRT**.

LN(2.718)	1.25276296849537
EXP(1)	3.5
LOG10(23.5)	1.37106786227174
10^B3	23.5
e	2.71828182845905
PI	3.14159265358979
SQRT(2)	1.4142135623731

Utility Functions

Sum, minimum and maximum, available as **SUM**, **MIN** and **MAX** will scan a list and return the relevant value. **COUNT** will find the number of non blank entries in a list. All these functions are of the form **FUNC(list)**.

SUMIF(crd1, crd2...crd3) is a conditional adding up function. Only those items in the range **crd2...crd3** will be included that correspond to a cell entry in the column specified by **crd1** and are on the same line.

	A	B
1		123.45
2	MARKER	23.45
3		245.56
4	MARKER	45.67

SUMIF(A1, B1...B4) gives the answer 69.12

SUM(B1...B4) gives the answer 438.13

It should be noted that **crd1** may point to any cell in the marked column but must not point to a cell with a text entry in it or an error message will result.

BLEEP Sets off a bleep. Use it as an audible signal.

GROW takes two arguments, a value and a percentage. The effect of GROW is to cause a percentage increase to the value. The form is GROW(value, percent). Despite the name, the percentage can be negative.

The following functions in this section are of the form *FUNC*(value).

The **ABS** function gives the absolute value of an argument, that is, the value ignoring the sign.

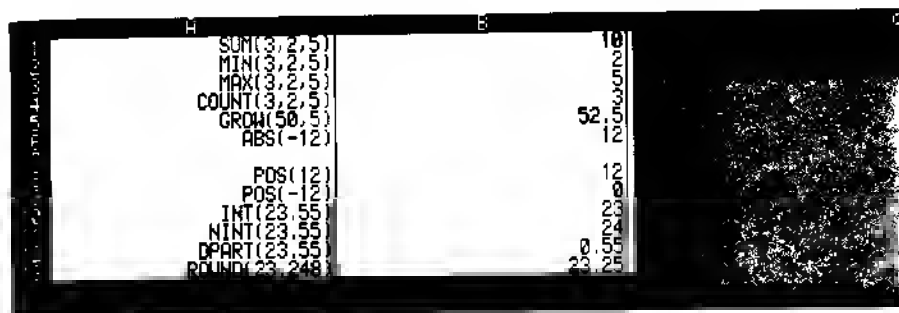
POS returns the value of the argument if it is positive but zero if it is negative. This is useful in tax calculations.

The integer (non-decimal) part of a number can be obtained with **INT** or if you want the nearest whole number to a value use **NINT**. The decimal part of a number is given by the function **DPART**.

ROUND is a useful function, it will round a value to 2 decimal places.

NOTE: it is very different from most of the functions in that it puts this rounded value back into memory and the original value is lost. You may need this function in complex financial calculations which otherwise would not balance because fractions of a penny (cent etc.) are having an effect.

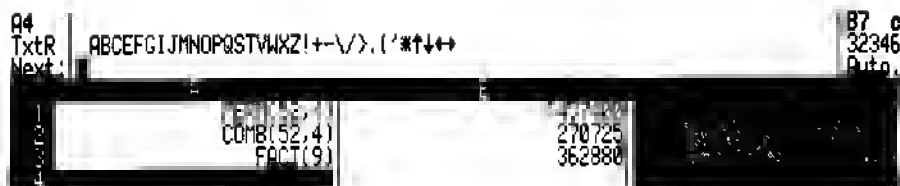
RND returns a true Integer random number between 0 and 127. A new value is picked each time the sheet is calculated.



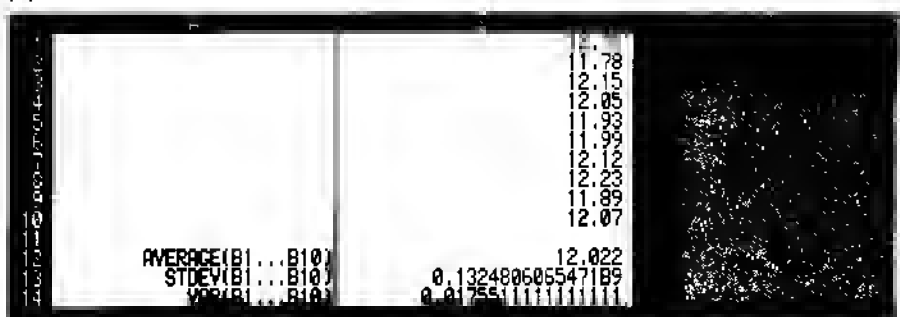
SUM(3,2,5)	10
MIN(3,2,5)	2
MAX(3,2,5)	5
COUNT(3,2,5)	3
GROW(50,5)	52.5
ABS(-12)	12
POS(12)	12
POS(-12)	0
INT(23.55)	23
NINT(23.55)	24
DPART(23.55)	0.55
ROUND(23.248)	23.25

Statistical Functions

Permutation and combination can be calculated with **PERM**(*n*, *r*) and **COMB**(*n*, *r*) where *n* is the total number of items and *r* is the number to be combined or permuted. For factorial use **FACT**(value).



Standard deviation and variance and average all act on a list to complete your set of powerful statistical tools. These functions are called **STDEV**, **VAR** and **AVERAGE**. (See the magazine BYTE Nov 1983 pp560-563 for the method used).

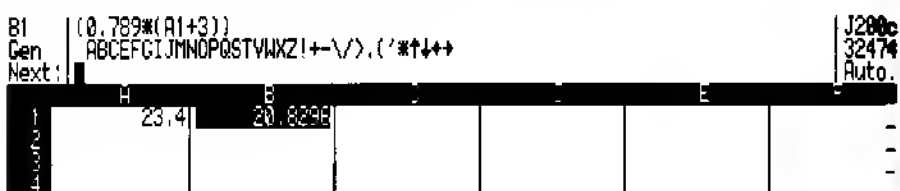


Defined Functions

A defined function works just the same way as a built in function does except that it uses a calculation that you have typed in yourself. It is therefore a way in which you can set up a complex formula once that you may want to use many times.

If is a single cell formula that can be used by other cells and, of course, after the first time you do not have to write the formula out in full again. Consider the following formula, $0.789*(A1+3)$, which uses the value held in cell A1. If you had to write it out 50 or 100 times it would get very time consuming and also quickly use up your available memory.

Let us try an example - set up a sheet as follows with a constant in A1, e.g. 23.4. Put the expression $0.789*(A1+3)$ in B1:



function is kept separate from the rest of the sheet. This is because every time the formula is re-used the cell values referred to by the original formula are changed to those given by you in the argument. If the value of the defined function cell was used in calculations by any other cell in the sheet, undesirable results will occur.

C3	(C1(A3,B3))	J200c
Gen	ABCEFGIJMNOPQSTVWXZ!+-\>.('*↑↓++	32421
Next:		Auto.
	(2)	(3)
	(5)	(6)

The above is an example where there are two cell references in C1. As a reminder, to get this type of display just type ☐ ☐ and the formulae will be shown instead of the results. The defined function call will be made in C3:

C3	(C1(A3,B3))	J200c
Gen	ABCEFGIJMNOPQSTVWXZ!+-\>.('*↑↓++	12813
Next:		Auto.
	5	6
	5	6

Note that the original values in A1 and B1 are changed by the call. You will see this if you press ! to recalculate the sheet.

Recap:

You have now had an introduction to many of the functions that are available for use in your expressions and should be beginning to get an idea of the power of the Notebook spreadsheet. We have looked in more detail at some of the many functions that are available to you. In particular, mathematical and statistical functions, some general purpose utility functions and user defined functions. Later in this tutorial we will be coming back to look at some of the more advanced types of functions and expressions and what can be done with these.

First, however, there are some more basic commands that have to be dealt with so that you can become completely familiar with the housekeeping of your worksheet and how to manipulate the data.

Tutorial VIII - More Techniques

Reorganising the sheet - Copy and Move

The Move command

You use the Move command to transfer parts of the sheet to another part of the work area.

Start with a blank worksheet (you should know how to do this by now). Fill up the four top left entries again using the '.' (Entry) command. Now type **M** **B** **A1** **B2** (Move Block of range A1 to B2):

1	(1)	Up, Down, Left, Right, arrows, Jump, J	J2000
Ext:	Destination		32464 Auto.
1			
2			
3			
4			

You are then asked for the destination of the move operation. Type **B3** (Jump to cell B3). The defined block will 'jump' with the cursor:

3	(1)	ABCEFGIJMNOQRSTUVWXYZ!+-\/.('*↑↓←→	J2000
Ext:			32464 Auto.
1			
2			
3			
4			

Try the Move command with some of the other options, e.g. line and column. The only option not available with the Move command is ALL.

The Move command will overwrite any data in the destination area. Because there is therefore some danger of you mistakenly destroying the sense of any calculations on the sheet, the spreadsheet will make a check and prevent you doing so. However, remember it will let you overwrite some data if it appears that no other parts of the sheet depend on it.

There are any co-ordinate references in expressions being moved

you will find these automatically adjusted in the new locations to take account of the new sheet layout.

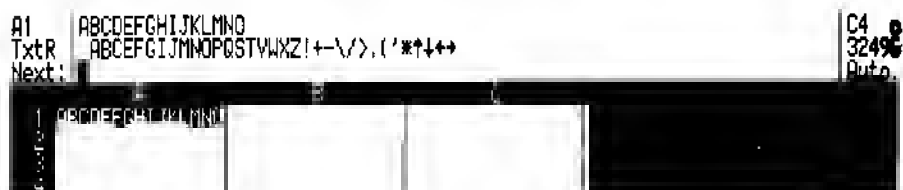
The cells that are moved take their own format definitions with them.

You cannot move or copy cells outside the sheet as it is currently defined. You will just receive the warning message "Cannot multiple move there". You may have to insert some new lines or columns to make room to move the block into.

Copying parts of the sheet

The COPY command can be likened to that known as 'replicate' in other spreadsheet software.

As well as moving data from one part of the sheet to another it probably come as no surprise that you can copy parts of the data. Start from scratch by Zapping the current sheet. Type [F3][C]15[Enter][F5][Enter] for 'Insert 3 Columns of width 15, Text, Right justified format' then [F3][L]3[Enter][Enter] for 'Insert 3 lines'. Then type [Enter] and put the entry **ABCDEFGHIJKLMNO** into cell A1.



Now let us use the Copy Entry command sequence by typing [C][Enter][Enter]. In this case use the arrows to move the cursor right when asked for the destination, then press [Enter]:



Now let us try Copy Line. Type $\text{[C]} \text{[L]} \text{[Enter]}$. Move the cursor down for the destination then press [Enter] :

```

32  ABCDEFGHIJKLMNOP
TxtR  ABCDEFGIJKLMNOPSTVWXZ!+-\/>.( '*†‡++
Ext:
C4 c
32448
Auto.

```

Now Copy Column. With the cursor in column B press $\text{[C]} \text{[C]} \text{[Enter]}$. Move the cursor right to column C for the destination and press [Enter] :

```

31  ABCDEFGHIJKLMNOP
TxtR  ABCDEFGIJKLMNOPSTVWXZ!+-\/>.( '*†‡++
Ext:
C4 c
32416
Auto.

```

Now try Copy Block defining the block as a rectangle from cells A1...B2. Move the cursor down and across to cell B3:

```

30  ABCDEFGHIJKLMNOP
TxtR  ABCDEFGIJKLMNOPSTVWXZ!+-\/>.( '*†‡++
Ext:
C4 c
32352
Auto.

```

In some ways the Copy command is the same as the Move command, only the contents of the original location are not deleted. There is, however, one major difference. If you have coordinates in your expressions being copied you will be asked whether you want the references adjusted. If you answer "Yes" and yes, for example, a row copy, every reference to other locations on that row will be changed to take account of the new location.

You can try an example of an adjusted copy to get a feel for what is involved. Type $\text{[F]} \text{[A]} \text{[Enter]} \text{[Y]} \text{[Enter]}$ to completely clear the sheet and then $\text{[M]} \text{[Enter]}$ to make a blank sheet of general format cells.

Type to put 2 into location A1, move the cursor to B1 then enter :

B1	(2*A1)	J200c
Gen	ABCEFGIJMNOPQSTVWXZ!+-\>.('*!+>	32485
Next:		Auto.
	2	

Then type for copy line:

B1	(2*A1)	J200c
Gen	Up, Down, Left, Right, arrows, Jump, <, File, Print, Mail label	32485
Next:	Destination	Auto.
	2	

Followed by to move the cursor down to the destination line then press .

When you press you will then be queried about adjusting references; it will not happen automatically, so type .

B2	(2*A2)	J200c
Gen	ABCEFGIJMNOPQSTVWXZ!+-\>.('*!+>	32485
Next:		Auto.
	2	

You can see that what was 2*A1 in B1 has become altered to 2*A2 in B2. If you think about it, the adjustment option has kept the meaning of the first line, i.e. 'two times the value on the left', in the second line. You will find it is very much the same for columns.

If you had pressed when asked **Adjust references** the formula in B2 would have remained 2*A1.

So far you have seen that Copy works the same as MOVE, except that the original data remains in the position it first was. The copied data overwrites anything that was already in the new position.

However, you will now see that the Copy command is much more

flexible than that - it can be used to copy data to a file or to the printer as well.

The option you would use to do this is Copy All. The Notebook spreadsheet only uses the ALL option to send the data from the sheet to the Printer (normally or as mail labels) or to a file. Copy All from one part of the sheet to another doesn't make sense.

However, you can of course, copy portions of the sheet, entries, lines, columns or blocks, to a file or the printer as well.

We will look at these in detail soon but for now it does no harm to run through the way data is saved to a file. Note the following sequence carefully.

Type ☐ ☐ ☐ for Copy All to File.



If you type **MYWORK** ☐ when prompted for a file name the whole of the sheet will be copied to a file called MYWORK.MEM.

In a similar way, all the entries could be copied to the printer. The command area and axes markers would be excluded.

Recap:

You have seen how the move and copy commands have many similarities. They can operate on sections of the sheet of variable size to transfer or reproduce data. Both overwrite any data already present at the destination. Both transfer the cell formats together with the cell data.

Tutorial IX

A note on adjusting references - lagged variables

You have seen that when using the Copy command you are prompted with the question:

Yes, No

Adjust references

When using the move command the adjustments are made automatically; you are not asked.

If you are moving or copying a **LINE** with adjustment then any internal references made to other cells along the same line will be adjusted to reflect the new position.

Similarly, when a column is copied or moved, adjustments are made within the column.

The same is true when a block is copied or moved - all references to cells within the defined block are also changed.

Normally, references to any cells which are outside the moved or copied section will not be adjusted. However, there is a built in option to get round this if you want to. Any reference will be automatically adjusted if you follow the reference to a cell with a single quote ('). The technical term used for this is an offset or lagged variable. In other programs you may see this referred to as a relative cell reference.

For example, a cell reference of A1 in cell B3 will always mean "the cell A1". However, a reference to A1' in cell B3 means "the cell that is one column to the left and 2 lines above the current cell". If the contents of B3 are copied/moved elsewhere and it contained A1 it would still contain A1. However, if it contained A1' and was copied or moved to D4, say, the reference would change to C2' which is the cell that is one to the left and two above D4.

It may not be immediately clear why you would want to do this, or how it works, so just follow this simple example.




Imagine you were preparing a sheet that is designed to carry a

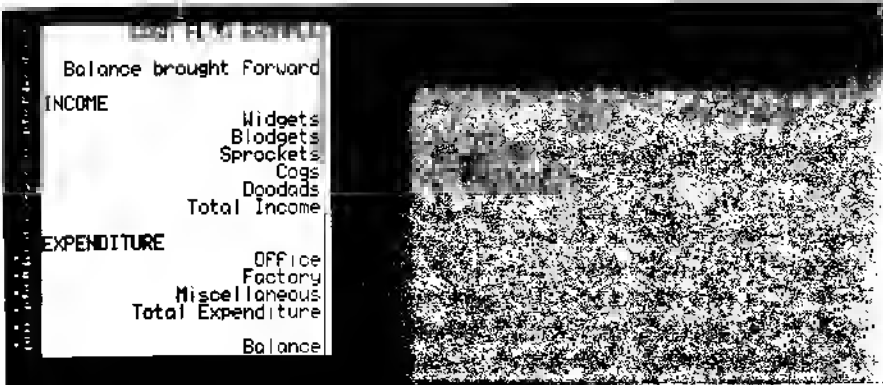
value from the bottom of one column to the top of the next, i.e. each column will contain a cell that refers to a cell in an adjacent column. If any of the columns were copied the reference to the previous column would remain unchanged unless marked by the Quote character, as a result the sense of the sheet would be lost.

The idea will be explained much more clearly if you follow this example for preparing a simple cash flow.

Preparing a simple Cash Flow

One of the most common applications for spreadsheets is budgets and cash flow predictions. You are going to see how to prepare a cash flow sheet using some of the short cuts that the Notebook spreadsheet provides. Even if you aren't interested in financial applications it is worth studying this example because it demonstrates multiple copying, lagged or offset variables and automatic reference adjustment.

You will normally start by setting up a text column with labels for the various items to be included in your cash flow. Here is a very simplified example. Remember that  can be used to see more lines in your worksheet and the  and  keys will go up and down a page at a time.



CASH FLOW EXAMPLE		PERIOD	CASH FLOW
Balance brought Forward			
INCOME			
	Widgets		
	Blodgets		
	Sprockets		
	Cogs		
	Doodads		
	Total Income		
EXPENDITURE			
	Office		
	Factory		
	Miscellaneous		
	Total Expenditure		
	Balance		

As you can see, there are four basic elements. These are the balance brought forward, the income, the expenditure and the balance for the period. The balance brought forward always refers to the previous period. The other three elements always refer to the current period.

Now you will see the rules that might make up such a sheet. This display was obtained using [F9] for eXchange command. Temporarily, the width of column B has been increased so you can see everything. At this stage, no actual values have been entered.

CASH FLOW EXAMPLE		
Balance brought Forward	????????????????????	
INCOME		
Widgets		
Blodgets		
Sprockets		
Cogs		
Doodads		
Total Income	<2> (SUM(B5...B10))	
EXPENDITURE		
Office		
Factory		
Miscellaneous		
Total Expenditure	<1> (SUM(B14...B16))	
Balance	<3> (B3+B11-B17)	

The line of question marks in cell B3 shows that it is used in a following calculation but no value has yet been put in. This is to remind you to do so later. This column is the dummy for the first month. Now you copy these formulae for the second month. With the cursor in column B type [C] [F9] [Enter]. Move the cursor right in the answer to Destination then press [Enter], answer [Y] to the **Adjust references** question, and you will arrive at:

B4 Gen Next:	ABCEFGIJKLMNOPSTVWXZ!+-V/.,('*+<=>	E19 1278 Auto.
CASH FLOW EXAMPLE		
Balance brought Forward	????????????????????	????????????????????

You can see the balance brought forward for this new column is still undefined. But it is equal to the value in B19 and so you can put B19 in C3. The balance brought forward always relates to the preceding column. You want to set up column C so that you can copy it a few more times for the other months and include the balance brought forward. If you just put B19 in C3 and copy it, then the value B19 will remain unchanged. The Copy command only adjusts the formulae that relate to references up and down the column, other references are unaffected.

There is a simple way round this problem. Just follow the reference by a single quote mark. This tells the Notebook spreadsheet that

you want the reference to be relative and it should be adjusted whenever a copy is made. So the entry you make in C3 becomes B19'.

3	Enter number or expression	E19 c
>>	B19'	32203 Auto.
CASH FLOW EXAMPLE		
	Balance brought Forward	

you now have a full dummy column for further copying. Note that the actual number of entries you have made so far is very few. For this example we are just going to set up two further months. This time you specify that you want the column to be copied two times. That is, $(C)(C)2$.

3	(B19')	E19 c
Up, Down, Left, Right, arrows, Jump, +, File, Print, Mail label		32188 Auto.
text:	Destination	
CASH FLOW EXAMPLE		
	Balance brought Forward	??????????

Again you will be asked for a destination and whether you want to adjust references. Make the destination the column to the right and answer (Y) to the adjust references question.

3	(C19')	E19
ABCEFGIJMNOQRSTUVWXYZ!+-\>.('*†‡		32018 Auto.
text:		
CASH FLOW EXAMPLE		
	Balance brought Forward	0

You can see that the balance brought forward has been adjusted for the new location in the way you would want. With a bit of tidying and the addition of actual figures you will achieve something like this:

CASH FLOW EXAMPLE

Balance brought Forward	1,000.00	17,700.00	43,200.00	34,660.00
INCOME				
Widgets	1,500.00	2,250.00	2,750.00	4,000.00
Blodgets	9,000.00	12,750.00	650.00	5,200.00
Sprockets	10,500.00	15,000.00	200.00	3,000.00
Gogs	2,300.00	500.00	800.00	2,800.00
Doodads	4,700.00	2,250.00	10.00	3,000.00
Total Income	28,000.00	32,750.00	4,410.00	18,000.00
EXPENDITURE				
Office	550.00	850.00	2,300.00	400.00
Factory	9,250.00	5,600.00	8,000.00	7,000.00
Miscellaneous	1,500.00	800.00	2,650.00	650.00
Total Expenditure	11,300.00	7,250.00	12,950.00	8,050.00
Balance	17,700.00	43,200.00	34,660.00	44,610.00

Tutorial X

Saving, Loading and Printing - A further look at the Copy command

When you create a new worksheet and type some data into it, the sheet you are working on is held in the spreadsheet program's own working memory. When you want to finish working on the data you must save what you have done into a "file". A file is just a computer word that means a collection of data that has been stored away for future use. In the word processor you are probably already aware that it stores what you type in "documents". Well, documents could also be referred to as "files" but in the case of the word processor the word "document" is more meaningful.

The difference between the word processor and the spreadsheet is that the word processor always asks you for a name before you start and then automatically stores what you have done when you press **[Save]**. In the spreadsheet, things work the other way round. You work on a sheet and then, at the end, you must use the Copy command to copy it to a file and give it a name at that time.

If you just leave the spreadsheet by pressing **[Quit]** or using the **[Q]** command before you have explicitly saved your work, it is still stored away for you in a file with the special name of RESTART.MEM. Later, when you next use the spreadsheet, you can reload this file very quickly by selecting the Restart option from the opening menu of the spreadsheet. You should not rely on this as the only means of saving as RESTART.MEM is over-written every time you leave the spreadsheet. It is far better to get into the habit of saving your work to a named file, using the Copy command, each time before you leave the spreadsheet.

To copy the data you have entered to a file give the destination as F for file. You will then be asked for a filename. Unlike the word processor, the spreadsheet imposes some limits on the names you can use. This is mainly because it always uses the same characters for the last 4 characters of the name. (Either .MEM, .TXT, .DIF or .DAT). This means that you can only actually give up to 8 characters, and a further restriction is that these may only include any printable character except \$*?=/,.; or space. The additional 4 characters are called an extension.

As you will see later, the spreadsheet treats each of these four types of file in slightly different ways and expects the information in them to conform to certain types. It is only by this extension that the spreadsheet knows what sort of data is held in a file so you must always make sure you select the correct one.

Valid names for spreadsheets might be:

SALES.MEM
BUDGET.DAT
INCOME.DIF
DEBTORS.TXT

The following names would not be valid:

JANUARYSALES.MEM	too long, must be 8 characters.
JAN SALES.MEM	no space allowed in name

If you are saving or loading .MEM (normal spreadsheet files) then you don't need to type the .MEM. For any of the other three types of file you must give the relevant extension. By doing this you will inform the spreadsheet of the type of file you want to read or write and, if reading, it will expect the file to contain information of a certain type.

The command sequence to load a file is CFname i.e. Copy File name (to the sheet).

To save a file the sequence is CAFname i.e. Copy All of the sheet to the File name.

Of course, you can save sections of the sheet such as a block by specifying alternatives to the All command e.g. CA1D3Fname.

If you wish to insert a file into a sheet that already exists it is necessary to create room for the incoming file. Alternatively, the incoming file can be simply appended to the existing one.

Blocks that are saved or loaded (or blanked) must be self contained, the formulae within must make no references to cells that are outside of the block.

It may be necessary to ensure that the defined formats of an existing sheet are of the correct type for the incoming file.

Let us look in more detail at the four types of file.

MEM

If you wish to save all or part of the worksheet in such a way that the Notebook spreadsheet can read it and display it in the original form then use the .MEM (for memory) extension.

You do not normally have to type .MEM as this is added automatically if you do not give an extension. This is the file type that you will use most of the time for day to day saving and loading of the sheets you work on.

Note also that the .MEM file is the only type that can be used to reliably load in a sheet that has not already been defined. It is the only option that will let you load in rows or columns that are empty of data. It can therefore be used for loading a predefined worksheet matrix into which you need only insert the data - a useful example would be in the preparation of yearly accounts that conform to a regular pattern.

If you intend to send or receive spreadsheet files to/from another computer and you use the spreadsheet program called "The Cracker" on that machine then you should use the .MEM file format as all information will then be preserved. The Cracker is the spreadsheet program on which the Notebook spreadsheet is based. Versions are available for Amstrad PCW and IBM PC compatible computers.

DIF

Next there is the .DIF file or Data Interchange Format file. This type of file can transfer text and numbers between different types of spreadsheet and is commonly used by graphics packages as a means of collecting the data. The Notebook spreadsheet can read and write these files. You should not concern yourself with the internal organisation of these files. The only time you are likely to use .DIF is when sending files from the Notebook to another computer that uses a different type of spreadsheet/graphics program.

TXT

If you want to write out all or a part of your worksheet to a file that can be used by an editor or word processing program, give it a filename that has a .TXT extension. This is very useful if you want to incorporate the results calculated by the Notebook spreadsheet into a full written report. The word processor in your Notebook can read in .TXT files produced by the spreadsheet.

You can also read a .TXT file into the spreadsheet and this provides a useful way of bringing in tables of information from other programs. The numbers and text coming in will need to be in a proper tabulated form as the information is allocated to cells in the sheet depending on its location along each line.

The .TXT file type is the only other example where it is possible to load in data without having first defined a blank worksheet. If you attempt to do this the Notebook spreadsheet will first read the number of lines in the data and assign each of these to a row in the sheet. However, all of the information across the lines will be assigned to one, possibly very large, column. Do make sure that this column is not allowed to exceed 127 characters, which is the absolute maximum column width possible.

Such a text file can be read and edited in the Notebook's own word processor. So, you could enter data in the word processor and then load it into the spreadsheet or you could read results from a spreadsheet into the Notebook's word processor. Remember that the file name you use must be limited to between 1 and 8 characters followed by the extension .TXT for this to work.

DAT

The .DAT extension is used when you wish to read a file of only numbers into your sheet. The file should be in character form such as you would get from an editor or word processor, or formatted output from a programming language such as BASIC. This could, for example, be produced by the Notebook's own word processor or the BBC BASIC that is built into the Notebook.


The file will be read in much the same way as prepared but be careful that if more than one column is being read then zero readings should be shown by a 0 and not just by blanks. It will do no harm but if there was a blank in the first column then the second column will be read as if it was the first. This form of file does not

have to be properly tabulated as the lines are scanned to search for the numbers on them. Each number can be separated by spaces or a comma.

Let us try an example of loading in one of these file types.

Use the Notebook's word processor to create a file called `EXAMPLE.DAT` which contains this information:

2.34, 23.7
456.73, 84
27, 3
63.3, 1234.5

Make sure there is a blank line at the end of the list. Then switch to the spreadsheet and create a blank worksheet by typing . This will definitely be large enough to take the incoming data.

Now use the Copy command to load in the data from the EXAMPLE.DAT file. Type **[F2][F2]example.dat[Enter]**. When asked for the destination just type **[Enter]** to indicate you want A1, the current cell, to be the start:

(2,34)
 ABCEFGIJYNOPQSTVWXYZ!+-\>/('*†‡++
 J200-
 32395
 Auto.

The entries from your incoming .DAT file will be displayed in the default format of the columns. Because the spreadsheet knows that a DAT file contains numbers only, if the default format is text then the General numeric format will be used instead.

remember that any blank cells must be represented by a zero and the layout may be structured wrongly.

For example if the EXAMPLE.DAT file contains this:

1.23

2.34. 5.67

The .DAT and .TXT file extensions cause very similar files to be produced except that in .DAT files any text is replaced by a 0 to maintain alignment and items are separated by commas. TXT files can be used in text editing programs such as a word processor while .DAT files can be used in programs that just want the numerical values to process them in some way.

When using the Copy All command to save worksheets to either DAT, DIF or TXT files remember that every cell in the defined sheet, even if it is blank, will cause spaces or zero entries to be written to the file. So, if you started with the Make blank sheet command which makes a sheet with 10 columns and 200 lines then, even if you only have a few entries on it, the resulting saved files could be huge. It is best to use the Copy Block command to only copy selected areas when saving data to files of these types.

Printing from the Notebook Spreadsheet

The Copy command is also used for printing data onto paper by specifying $\left[\begin{smallmatrix} P \\ x \end{smallmatrix} \right]$ for printer as the destination. Any specified Entry, Line, Column, Block or All of the sheet can be printed. The data that is printed will appear without any column dividers, status lines or other system messages. It will be spaced and displayed in a way that conforms to the existing display format, column widths etc.

In order to fit a lot of data on a page you may wish to make use of the OUT command to send control characters to your printer. Condensed print can then be selected. Consult your printer manual for details of what type codes it is capable of, and which codes are required to select between them.

You will find that a lot of printers (Epson compatible) list character 15 as the sequence to switch into condensed print. Character 18 is used to switch back from condensed printing. You can send this code from the spreadsheet by typing $\left[\begin{smallmatrix} O \\ 6 \end{smallmatrix} \right] \left[\text{.....} \right] + \left[\begin{smallmatrix} O \\ 6 \end{smallmatrix} \right] \left[\text{...} \right]$. Later, to switch condensed off, use the command $\left[\begin{smallmatrix} O \\ 6 \end{smallmatrix} \right] \left[\text{.....} \right] + \left[\begin{smallmatrix} R \\ 6 \end{smallmatrix} \right] \left[\text{...} \right]$. You may also find that to switch NLQ printing on and off you must send ESC x 1 or ESC x 0. The "ESC" character is character 27, which you can type as Control-[so, to send an NLQ off sequence you could type $\left[\begin{smallmatrix} 27 \\ 0 \end{smallmatrix} \right] \left[\text{.....} \right] + \left[\begin{smallmatrix} 27 \\ 1 \end{smallmatrix} \right] \left[\text{...} \right]$.

It is sometimes desirable to be able to print out a copy of the formulae or data as it was entered rather than as it appears under the current format. Use the $\left[\begin{smallmatrix} x \\ \end{smallmatrix} \right]$ for eXchange command to alter

the display and then amend the column widths as required. (It is important to remember this last step or the full width of your expressions will not print).

Printing mail labels

If you want to use the Notebook spreadsheet to keep records of names and addresses see also the later sections on Searching and Sorting of data in Tutorial XII which you will probably find useful.

If you do keep lists of names and addresses then you probably will also want to prepare and print address labels. Blank labels are available on listing paper suitable for most printers. The Notebook spreadsheet is able to produce these labels for you. Your address list will, however, need a little preparation in the spreadsheet.

The first stage is to indicate the ends of the lines to be printed. To do this, you must insert columns at the appropriate points, each with a default format of "Carriage Return". A Carriage Return is the code that you send to a printer that signals that you want it to start a new line. This has been included in the possible categories of default formats solely to allow you to control your printer when making labels. You cannot actually enter any data into a column that has been given this format.

There is an example file called ADLIST.MEM in the built-in demonstration files that shows how a list of names and addresses may be stored. The following description is based on that example.

From the opening screen of the spreadsheet type **[F]ADLIST[Enter]**. This will load in the demonstration list of names and addresses. This is just a typical set of data to show you one possible way in which it could be laid out.

In this example you will not want to print the last column as it only contains an amount of money. You must start by putting a carriage return column in front of column C: Move the cursor to anywhere in column C and type **[F]1[Enter][F]1[Enter]**. This inserts a column of width 1 which has a format type of Carriage Return.

C1	ABCEFGIJKLMNOPSTVWXZ!+-\>.('*+!++	G17	32247
Corr			
Next:			
First	name	no	addr
	T. Cowan	16	Jeremy Grove
	G.L. Blake	37	Osmaston Road
			Hampton Knowle
			17
			56

Now two further such columns are needed, one in front of the "own" column (F) and one at the end in front of the "S" column (G):

117 c
32247
Auto

ABCEFGIJKLMNOPSTVWXYZ!+-\/>.('*†‡++

Init	Name	No	Loc	own	S
T.	Cowan	16	Jeremy Grove	Hampton	17
L.	Blake	37	Osmaston Road	Knowle	56

Now you are in a position to print out your first trial set of labels. You only want to print a portion of the sheet and so you use the Copy block option. Note that the Mail labels option intercepts the carriage return columns that you have set and works out the way the printout should be organised to produce the desired effect - you don't actually get a new line started wherever there is one.

Note that it is absolutely essential for you to make sure that the end of the range is on a Carriage Return Format column. You can see that cell H7 above is such. Omitting this requirement will do no harm but will not give sensible results. You now need to copy a block of the sheet to the printer. Type $\langle \text{C} \rangle \langle \text{B} \rangle \text{A3} \langle \text{C} \rangle \text{H7} \langle \text{C} \rangle$. When asked for the destination type $\langle \text{M} \rangle 2 \langle \text{C} \rangle$ (for Mail labels, 2 across). The names and addresses should now be printed two abreast:

117 c
32247
Auto

0-9, +

Destination Mail Labels, groups of 2

Init	Name	No	Loc	own	S
T.	Cowan	16	Jeremy Grove	Hampton	17
L.	Blake	37	Osmaston Road	Knowle	56

Here is what they will look like. Not very organised, but your next task is to change the width of the columns so that various parts line up under one another:

T.L. Blake A.J. Hunt
37 Osmaston Road 25 Latimer Road
Knowle Wythall

A. Fisher C.D. Beard
2 Florence Road 86 Valley Road
Kenley Redditch

R.T. Cowan
16 Jeremy Grove
Hampton

After some width adjustment, here is what you can achieve. In this case the labels are going to be printed three abreast:

Alt	Init									117 c
Text										32247
Next:	Destination Mail Labels, groups of 3									Auto.
	Init	Name	No	Road		Town				
		R.T. Cowan	16	Jeremy Grove		Hampton				17
		G.L. Blake	37	Osmaston Road		Knowle				56

G.L. Blake	A.J. Hunt	H.A. Fisher
37 Osmaston Road	25 Latimer Road	32 Florence Road
Knowle	Wythall	Henley

C.D. Beard	R.T. Cowan
86 Valley Road	16 Jeremy Grove
Redditch	Hampton

The column widths used in this case are A=4, B=16, C=1, D=3, E=17, F=1 and G=21. The NW command is used to change widths of existing columns.

Further adjustment may be needed with extra lines at the end or changes in spacing to suit the particular labels. You will find that this is quick and easy by trial and error.

Note that if you had used the simple Print option rather than Mail labels the Carriage Return columns would have produced unpredictable and probably undesirable results.

Recap:

We have seen how the Copy command is also used for saving and loading data to/from files in memory and also for printing the data.

When saving or loading, the choice of name extension signals to the Notebook spreadsheet which type of data it should save/load.

When printing you may have to make use of the OUT command and a special Carriage Return format in order to get the desired effect.

Tutorial XI

Partitioning the screen

As your worksheet gets larger you will at times want to work somewhere like the bottom right hand corner but still see your line and column headings which are at the top of the sheet. You can do this with the partition commands. These allow you to split the screen horizontally or vertically or both so that you get two, or four smaller displays. The usual term for such split screens is 'windows'.

As well as moving them independently you also have the option of locking the windows so that as you move in one port the other will move in a synchronised way. For example if you scroll the lower window the appropriate headings will scroll past in the top of the screen. It is easy to move around and between the windows with single key commands. One of the demonstration files can be used to experiment with this feature. Clear your previous work with **Z** **A** **Y** **Y** then re-load the example file with **P** **ADLIST**.

Init
xt: ABCDEFGHIJKLMNOPQRSTUVWXYZ!+->./'*/%+>>

F17: 32247
Auto

	Name	No	Road	Town	
R. T.	Cavan	16	Jeremy Grove	Hampton	17
R. L.	Blake	37	Osmaston Road	Knowle	56
R. J.	Hunt	25	Latimer Road	Nuthall	46
R. P.	Fisher	32	Florence Road	Henley	25
R. D.	Beard	86	Valley Road	Redditch	25

First you are going to see the screen partitioned vertically. As you type **P** **X** **V** for Partition Vertically you will see that a line of numbers is put up on the screen. You must use this to judge where you want the split to take place. The number you choose will be the first location of the second window on the screen. You can see that the number 26 is about half way across the screen. Type **26** **V** and the second window, to the right, will start at the indicated column 26.

Init
xt: Partition screen vertically 0-9, V

F17: 32247
Auto

	Name	No	Road	Town	
R. T.	Cavan	16	Jeremy Grove	Hampton	17
R. L.	Blake	37	Osmaston Road	Knowle	56
R. J.	Hunt	25	Latimer Road	Nuthall	46
R. P.	Fisher	32	Florence Road	Henley	25
R. D.	Beard	86	Valley Road	Redditch	25



123456789012345678901







A1 Init
 TxtL ABCDEFGIJMNOQRSTUVWXYZ!+-\/>.(?*[+*+
 Next:

F17.9
 32247
 Auto.


Init	Name	No	Road	Init	Name	No	Road	Youn
R.T.	Cowan	16	Jeremy Gro	R.T.	Cowan	16	Jeremy Grove	Hampton
G.L.	Blake	37	Dsmaston R	G.L.	Blake	37	Dsmaston Road	Knowle
A.J.	Hunt	25	Lotimer Ro	A.J.	Hunt	25	Lotimer Road	Wythall
H.A.	Fisher	32	Florence R	H.A.	Fisher	32	Florence Road	Henley
C.D.	Beard	86	Volley Roa	C.D.	Beard	86	Volley Road	Redditch






You should now have two sets of columns A..D. Don't be confused by seeing the same information in both parts of the screen, it merely means that both windows are set to the same part of the worksheet. You can leave the left view where it is and on a big worksheet move the right view far across the sheet.

The next command to investigate is the slash . This is used to jump between horizontal window sections. The first time you press it the active cell cursor switches from being to the left of the partition line to the right. Press  again and you will see the cursor jumps back to the left window of the display.

The effect as you can see is to jump to the same cell but in the other window. Move the cursor in the right window so that it scrolls left. Notice that the right window continues to display the original position. Press  and the cursor jumps back to cell A1 in the left window. If you want both left and right windows to scroll together you must lock them together. To lock them use the  (Parttlan Synchronised Vertical) command sequence:

Now, as you scroll one of the windows left and right you will see that the contents of the other window follows it.

If you push  to switch between the normal and enlarged display any horizontal partition will be lost but vertical partitions are maintained.

You can divide the screen vertically in a very similar way using  (Partition screen Horizontally) and specifying the grid number, which is printed in column A of the right hand window. Type  to keep the column labels at the top of the screen:

A1 Init
 TxtL ABCDEFGHIJKLMNOPSTVWXZ!+-\>.(/*↑↓↔
 Next:

F17 g
 32247
 Auto.

Init	Name	No	Road
R.T.	Cowan	16	Jeremy Gro
G.L.	Blake	37	Osmaston R
A.J.	Hunt	25	Latimer Ro
H.A.	Fisher	32	Florence R
C.D.	Beard	86	Valley Roa

Init	Name	No	Road	Town
R.T.	Cowan	16	Jeremy Grove	Hampton
G.L.	Blake	37	Osmaston Road	Knowle
A.J.	Hunt	25	Latimer Road	Wythall
H.A.	Fisher	32	Florence Road	Henley
C.D.	Beard	86	Valley Road	Redditch

There are now four parts to the screen. To move between the horizontal parts you use the backward slash [\]:

A9 Init
 TxtL ABCDEFGHIJKLMNOPSTVWXZ!+-\>.(/*↑↓↔
 Next:

F17 g
 32247
 Auto.

Init	Name	No	Road
A.J.	Hunt	25	Latimer Ro
H.A.	Fisher	32	Florence R
C.D.	Beard	86	Valley Roa

Init	Name	No	Road	Town
A.J.	Hunt	25	Latimer Road	Wythall
H.A.	Fisher	32	Florence Road	Henley
C.D.	Beard	86	Valley Road	Redditch

You can synchronise the parts horizontally or stop it at any time. To get rid of the partitioning just type [P] [E] for Partition End. If you save the worksheet to a file it will be in the unpartitioned form when next loaded.

Recap:

After entering headings or explanatory comments into one part of a sheet it is often desirable to be able to see these even when the cursor has moved to a distant part of the sheet.

The Partition command lets you define up to four separate windows on the sheet which can be locked to scroll together or left independent.

C5	25	ABCEFGIJKLMNOPSTVWXZ!+-\./.'*+!++	F17 c
Text			32247
			Auto

	16	Jeremy Grove	Hampton	
G.L.	37	Osmaston Road	Knowle	56
J. J.	35	Latimer Road	Wythall	43
H.A.	32	Florence Road	Henley	28

The cursor ends up at the location of the string. Using the command **[F7]** will find the next occurrence at cell F7.

You should remember that only the actual cell formulae, numeric data and text entries are searched. If, for example, the last column had been in financial format and you had tried to search for 25.00 you would not find it even though it was displayed. As you can see from the contents line only 25 is actually stored in the memory. In practice this means you can only search for things that can be displayed on the contents line.

The Get command is useful for making long jumps across a complicated sheet. You can insert special text entries as markers which help you to quickly find the right place even if insertions and deletions have been made.

Sorting the lines

The Notebook spreadsheet can selectively sort lines. You can specify the part or whole of a column you want to be used as the basis of the sort. Both text and values can be sorted, either increasing or decreasing. With this facility you can handle address lists and client lists. By using only part of columns in the sorts you carry out many of the activities that you would otherwise use a database management program for. This example assumes you still have the ADLIST example file loaded. In this example the lines are going to be sorted using the name as the basis. There are only valid name entries in the cells B3..B7 so this is specified as the range to be sorted. Type **[F7]B3..B7**:

Init	ord...	ord...		F17 c
Sort Lines using name: B3..B7				32247
				Auto

Init	16	Jeremy Grove	Hampton	17
G.L.	37	Osmaston Road	Knowle	56

Tutorial XIII -

More complex use of the sheet

More advanced expressions and functions

Here we are going to look at more advanced Functions available to you for use in your expressions. If you feel that we have already covered all of the built in functions that you can take in during the early stages please feel free to skip these sections and concentrate on getting practice with the spreadsheet. However, we do recommend that you try to find time to read about all of the functions later when you are more confident. Remember that the Notebook spreadsheet is designed to be a time saving tool for you, and it may be capable of much more than you had in mind when you first started to use it.

The IF, THEN, ELSE functions

This is a special function group which is known in computing terms as a conditional branch. All this really means is that the outcome of the function changes depending on the result of a test that is made on some portion of the data. It is a method of introducing decision making into the spreadsheet such that the calculations performed vary in their result if certain conditions are or are not met.


This conditional function is of the form:

IF(expression), THEN(expression), ELSE(expression)

The first expression, following the IF, must be logical. 'Logical' is another piece of jargon that just means it must have an answer of TRUE or FALSE. An example of a logical expression is IF (B3=4) which has a value of TRUE if B3 does equal 4 or FALSE if it does not.

If the IF(expression) is indeed TRUE the THEN(expression) part of the function becomes operative and the current cell takes the value calculated by the expression after the THEN. When the IF port is worked out to be FALSE then the ELSE(expression) is used.

The full list of special operators you can use to give you an answer of TRUE or FALSE are:

=	equal
!	not equal (this is the symbol on )
>	greater than
]	greater than or equal
<	less than
[less than or equal

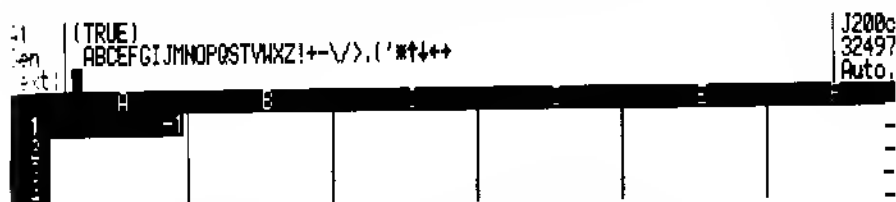
You can also use the functions TRUE or FALSE themselves instead of an expression. In other words you can just type the words TRUE or FALSE in as a cell entry. They do not have arguments so nothing else has to be typed in. Although they are words they count as numeric functions, not as text.

If an expression entry is TRUE it is given a value of -1 and if it is FALSE it is set to 0. Don't worry about why this should be so, the reason lies deep in the roots of the history of computing and in the way that the logical functions work. Just be aware that if you put a logical expression into a cell these will be the displayed values.

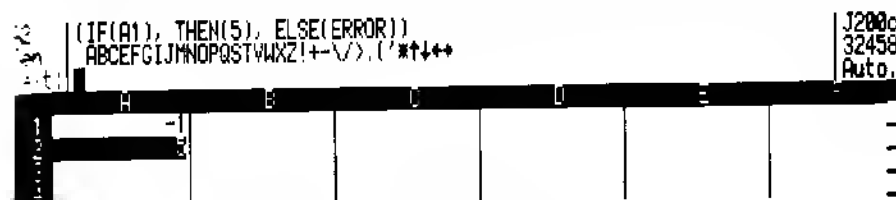
Alternatively you can set another cell, say B3, to TRUE or FALSE and then use the conditional in the form IF(B3), THEN(*expr1*), ELSE(*expr2*). It should follow from the above explanation that what this means is IF B3 reads TRUE then calculate expression *expr1*, else (if B3 reads FALSE) calculate expression *expr2*.

In place of the normal expressions after THEN and ELSE you can use the special function ERROR. If this is encountered during a calculation then the calculation is stopped and a message is put up on the prompt line. You can treat this as if it is a normal error message. No harm can be done using this function. It is a useful method for checking for genuine errors, for bringing macros to an end, or for warning the user that a certain unwanted result has occurred, for example if profits drop below a certain figure.

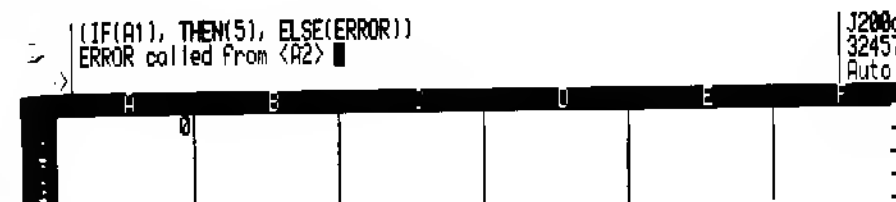
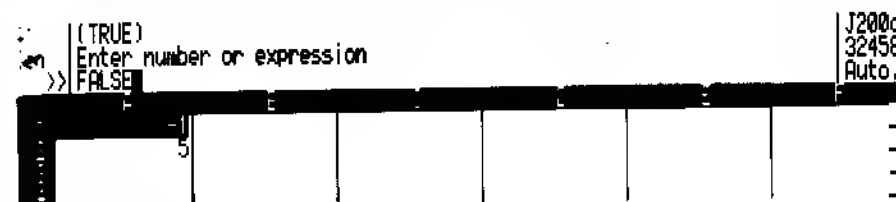
You can now try an example which includes some of these functions and features. Clear the worksheet and use **M₀** to make a blank one. Now type **TRUE** into A1:



Note that A1 takes on the value -1. Type **Down** to move to A2 and type **IF (A1) , THEN (5) , ELSE (ERROR)** which means if A1 is TRUE then give A2 the value 5 otherwise indicate an error:



As A1 was TRUE then A2 has become 5. You can now change A1 to see the effect on A2. Type **F₅ and F₆** **FALSE**:



A2 has taken the value 0 for FALSE. Because of the automatic recalculation feature, the error message has already come up saying where it was found. In order to make sure that you have noticed it the error message will not let you continue until you have pressed any key. You will also find the current cell has been automatically

changed to the one with the **ERROR** function in it so that you can do something about it.

Table handling functions

Several functions are available to let you extract values from a specified list of cells. They are used in the same way that we would look up and read values from a table or list.

As a first example you are going to see the **LOOKUP** function. This function, when given a value looks along a list to see where this specified value lies and then takes a reading from the adjacent row or column. Consider it as being the same as looking up a value in a printed table where you look for your value in the first column to get your answer in the second, such as logarithm tables.

A typical example of the use of this function may be finding a commission percentage given sales income. These rates tend to jump from band to band. An example of this can be found in the demonstration files called **SALES.MEM**. Zap any sheet you have loaded and then load the example using the command **[F]SALES[↵]**.

A1	COMMISSION CALCULATION			C18
Text	ABCEFGIJMNOQRSTUVWXYZ!+-</>.('*#&+<=>			32002
Next:				Auto
	A COMMISSION CALCULATION			
		Sales	Commission (%)	

In this case the salesperson brought in £15,000 worth of business and so he managed to get into the band between £10,000 and £20,000 for which he gets 10% commission.

The form of the function is **LOOKUP(value, list)**, the result returned by the function is taken from the adjacent list. You can see it used in cell B16 of the sheet. Type **[F]B16[↵]** to move directly to it. The value to lookup is in cell B12 and the list of values is in cells B5...B10. The corresponding percentage is taken from the column to the right of the lookup list - that is, column C.

There is a similar function which you can use in the same way called **INTERP** which will interpolate a value from a list. It differs from **LOOKUP** in that the function tries to work out (interpret) the desired answer even if it is not present in the list. This is used in B17.

B17 (INTERP(B12,B5...B10)) C18 c
 0Fin ABCEFGIJMNOPOSTVWXZ!+-\>.('*+!+- Auto.
 Next:

15			
16	Commission one value per band	10.00	1,500.00
17	Commission on a sliding scale	15.00	2,250.00

Here the salesperson has been told that the commission will be calculated on a sliding scale based on the sales and commission table. As £15,000 worth was sold this is midway between £10,000 and £20,000 and so he can expect a commission midway between 10% and 20%. The **INTERP** function does this calculation for you and in this case comes up with the answer 15%.

The **CHOOSE** function will look at a list and return the value of the cell in the position in the list given by the first argument. The form of this function is **CHOOSE(value, list)**. The value will be rounded to the nearest whole number if it isn't one already.

	CHOOSE(4, A1...A5)	4000
1000		
2000		
4000		
10000		
20000		

In this example the **CHOOSE** function at A8 has looked through A1...A6 to find the 4th cell and returned the value held in it, in this case 4000.

NPV stands for Net Present Value and is a discounted cash flow function that calculates the effect of a discount rate on a set of cash flow figures. The form of the function is **NPV(rate, list)** where *rate* is the discount rate in percent and the *list* is a list of cells that contain cash flows. If you do not intend to use the Notebook spreadsheet for financial calculations then there is no need to bother following the next example.

(NPV(B3, B2...F2)) F200c
 ABCEFGIJMNOPOSTVWXZ!+-\>.('*+!+- Auto.
 Next:

	YEAR	1989	1990	1991	1992	1993
CASH FLOW		1,000.00	1,200.00	1,500.00	2,000.00	1,000.00
DISCOUNT RATE		15				
PRESENT VALUE						

In this example you can assume that in 1993 same money is to be invested and the figures above represent the expected yearly returns on that investment. To find out how the Investment will perform, the yearly values each need to be converted to 'present values' and summed. In this instance they are all converted to 1993 values.

The first return in 1994 will be calculated as $1000/(1+dr/100)$. The 1000 is effectively worth less because of the one year taken to get it. The next year 1200 is obtained but this is worth less still because it is discounted once for 1994 and again in 1995 so its present value is calculated as $1200/(1+dr/100)/(1+dr/100)$ and so on. The value of the return in n years is: $\text{return}/((1+dr/100)^n)$.

The 'Internal rate of return' is the discount rate necessary to make the present value equal to the initial investment. It can be found by trial and error, changing the value of discount rate until you get the right answer. An example of how they can be automated and the Internal rate of return can be calculated by the Notebook spreadsheet is given in the demonstration file called IRR.

Zap any sheet you are working on and type **[F2]IRR[Enter]** to load this sheet. Type **[F2]A16[Enter]** to move to the cells where the result is calculated. Then type **!** to force a calculation. You will see that several calculations are performed until it settles on a final value when the trial present value gets close to the target of £5,000. Use of DO, WHILE to perform repeated recalculations is explained in a later tutorial.

If you want to do a numerical integration then you would probably use Simpson's rule. You can use the function **SIMPRULE** to do this directly.

Integral of Sinr(x) between 0 and PI/2 given by SIMPRULE(PI/8, B1...B5)	
SINR(PI/8)	0.38268343236509
SINR(PI/4)	0.707106781186548
SINR(3*PI/8)	0.923879532511287
SINR(PI/2)	1

In this example 5 values of SINR(x) have been calculated at intervals of PI/8. The SIMPRULE function has been used to obtain an approximate value of the integral. The exact value is 1. The form of

the function is **SIMPRULE**(step, range), the range must have an odd number of values.

A Note on lists

In most functions a list can be specified using a range such as B1...B5. You can, however, have blank entries in your range and the function will still be worked out correctly. This feature allows you to set up a template worksheet and enter your particular data later. It will also cater for the situation where the number of items will be variable.

Date and Time functions

The **DATE** and **TIME** functions may be used in financial calculations, such as tax returns or yearly balance sheets, it is often the case that some account of the time of year has to be taken when determining the required output. By entering values for the time of year automatic adjustments can be made within the program.

Dates in these functions are expressed in the form *ddmm.yyyy*. The *dd* - day part - can be 1 or 2 digits, the *mm* - month part - should always be given as two digits so, for example, April is 04. The year should always be expressed as 4 digits. Some valid dates are:

1109.1957	11th September 1957
904.1963	9th April 1963
2407.1993	24th July 1993
2512.1993	25th December 1993

DATEAFTER(date, days)

Gives the date that will be the number of days specified after the input date. So, for example **DATEAFTER**(312.1992, 120) means - give me the date of the day which is 120 days after the 3rd December 1992. The answer is 204.1993, the 2nd April 1993.

DAYSAPART(date1, date2)

Gives the number of days between any two specified dates. For example, if you were born on 9th April 1963 and today's date is 5th August 1992 you could use **DAYSAPART**(904.1963, 508.1992) to see that you were 10,711 days old (or 257,064 hours or 15,423,840 minutes or 925,430,400 seconds old!)

DAYOFWK(date)

Returns the day of week as a number. Saturday has a value 0, Sunday 1, Monday 2 etc. DAYOFWK(508.1992) is 4 which means 5th August 1992 falls on a Wednesday.

DAYOFYR(date)

Returns the number of days between January 1st and the present day. For example, DAYOFYR(508.1992) gives the result that 5th August is the 218th day of the year. By dividing this by 7 you can see that it is in week 32.

Note: For the following functions to operate correctly you must make sure the date and time in your Notebook are set before starting the spreadsheet. Setting the date and time was described earlier in the manual.

YEAR

Gives the current year as a four digit number.

MONTH

The current month as a number between 1 and 12

DAY

The day of the month as a number between 1 and 31.

HOURL

The hour in 24 hour format as a number between 0 and 23.

MINUTE

The current minute as a number between 0 and 59.

SECOND

The current second as a number between 0 and 59.

DATE

Returns the date in the form of a single number, for example 312.1992 being the 3rd December 1992.

TIME

Returns the time in the form of a single number, for example 1503.23 - being 3 minutes and 23 seconds past 3 in the afternoon.

ZEROTIME

Resets the elapsed time counter. Probably best included in an IF, THEN, ELSE entry.

TIMELAPSE

Returns the elapsed time since the ZEROTIME function was last operative. This is in seconds.

DELAY(n)

Does nothing until *n* seconds have elapsed. It may be a cell reference or a value. For practical reasons make it a cell reference with a value 0 until you actually want to run your application.

BLEEP

Sets off an audible tone. This can be used as a warning signal. On a sheet that takes a long time to calculate you could include the BLEEP function in the final cell to be calculated. You will then get a beep once re-calculation has finished.

27
Sen
Text:

ABCEFGIJKLMNOPSTVWXZ!+-\>.|'*/\+

J283c
31952
Auto.

1

This was produced at 15:37:44 on Monday 28th June 1993

2

DATE

2806,1993

DATEAFTER(B4,110)

1610,1993

3

TIME

1537.44

DAYSAPART(B4,E4)

110

4

YEAR

1993

DAYOFWK(B4)

2

5

MONTH

6

DAYOFYR(B4)

179

6

DAY

28

Week = INT(E7/7)

25

7

HOUR

15

8

MINUTE

37

9

SECOND

44

Tutorial XIV

An introduction to 'command' functions

There are certain functions that we are now going to come across that are fundamentally different to those we have seen so far. The principle difference is that they act on a cell or cells other than the one in which they have been entered. They can be looked on really as more like commands than like the mathematical functions we have come to understand.

These functions are useful in that they can be used to automate some actions that you may normally have had to do yourself if you were using direct commands.

For example they can be used to create a worksheet that performs an entire set of calculations as soon as it has been loaded and the recalculation started. Certain of the demo files, IRR for example, use this feature.

They are also useful for creating subroutines that perform a range of actions or calculations automatically. We will see later how such a technique can be used to create and fill a table of values.

Examples of functions that behave rather like commands are **SET** and **INIT**, which assign a value to a distant cell rather than the one they are in, or **INC** and **DEC** which can alter the value held in a distant cell.

There are also some command-like functions that may read a value from a distant cell but do not act on anything in particular. An example would be one of the Graphics functions we will see later such as **MAINTITLE(crd)**. This reads the text to be displayed in a graph title from a distant cell, but it cannot display the answer it gets in its own cell because of different format types - it reads from a text cell but is used in a numeric cell.

Remember that because they are **FUNCTIONS** with arguments they must always be entered into a cell that has a numeric format.

Because the command functions act on a cell or cells other than the one in which they have been entered, and because that distant cell may sometimes contain text data, it is sometimes unclear what value the actual function cell itself will display. In fact,

sometimes you will find they display the same value as held in the constant cell (if they can) and sometimes they will just display a zero.

To avoid confusing the display of the sheet you may wish to place these command functions in a seldom seen area of the sheet. It doesn't matter where they go - the Notebook spreadsheet will always find them.

Multiple function lines and dividing commas

When you are entering functions into a cell it is valid to insert a dividing comma between them. The effect of a dividing comma is to cause an effective restart as if what follows was the beginning of the line.

The value that will be displayed in the cell will be that of the expression after the last dividing comma.

For example start with a blank sheet and enter 10 into A1 and this expression into B1:

`2*A1,A1`

(2*A1,A1) ABCEFGIJMNOQRSTUVWXYZ!+-*/>.(^*+<-)									
									J2000c 32481 Auto.

The first calculation, `2*A1`, is performed but is effectively forgotten. All that appears in B1 is a copy of A1 because this is what appears after the comma. This feature so far looks like a waste of time and memory but consider its application to the 'command' functions described above.

By entering this expression into B1

`SET(C1,10),SET(C2,20),SET(C3,30),SET(C4,40),A1`

(SET(C1,10),SET(C2,20),SET(C3,30),SET(C4,40),A1) ABCEFGIJMNOQRSTUVWXYZ!+-*/>.(^*+<-)									
									J2000c 32382 Auto.

Because the command functions all act on Distant cells their effect is performed on the sheet even though cell B1 finishes by only displaying the value obtained after the last comma. None of the earlier commands are wasted. This technique is also useful with the **BLEEP** function.

It should be obvious that only these command functions have a useful effect if they are followed by a comma.

Not all command-like functions can be treated in this way and some of the Graphics functions in particular will give unpredictable results if followed by a comma.

I/O FUNCTIONS

It is unlikely that these functions will be of any use but they are included for compatibility with other versions of the Cracker spreadsheet, should you wish to use files from the Notebook on other computers. Use of these functions, especially OUT, on the Notebook will almost inevitably lead to the machine crashing in which case all you can do is switch it on holding down **Function**, **Esc** and **Ctrl** but this will lose all data you have stored in the Notebook.

IN(port)

Reads an 8 bit port given by the number or cell reference *port*.

OUT(port, value)

Outputs a value given by a number or cell reference to the *port* given by a number or cell reference.

Tutorial XV

Producing graphs and charts

The graphics part to the Notebook spreadsheet has been designed to allow you to create a graph with the minimum of work but you must of course provide the spreadsheet with some information about what you want plotted and how.

To do this there are some special functions, detailed below, that tell the graph plotter just what you want it to do. These can be entered anywhere you like in the sheet - the Notebook spreadsheet will be able to find them.

There are two distinct types of graph that may be plotted:

- 1) For the business chart types you just supply a single set of values (Y values) and each is plotted at a subsequent X position. You also supply a set of labels for the X axis which will often be some time interval (such as the months of a year). You can actually have several Y values for each point on the time axis.
- 2) For the scientific types of graph you supply (x, y) co-ordinate pairs for the points to be plotted. In this case the idea of "time labels" does not exist although, obviously, the X values could indeed be time increments.

PLOT1.MEM and PLOT2.MEM, included in the demonstration files, are examples of business and scientific graph plotting. You may wish to load these spreadsheets and exchange the rule/formulae commands to see how the functions are used in practice.

To see how a graph is plotted, zap any sheet that is loaded and then type **[F2] PLOT1 [F2]** to load the demonstration file called PLOT1. The command to force the spreadsheet to draw a graph is **T** for trace. Type **[F5] [F2]** to send the trace output to the screen. This will take some time; the rotating indicator shows that the spreadsheet is still working.

Initially a small version of the graph is shown on the screen. This is scaled so that the complete picture fills the screen. You get an overall picture of how the output would look when printed. Press the **[W] [F2]** and **[F5] [F2]** keys to switch between this reduced view and a

larger view of the graph. When the larger view is shown the **[T]** and **[I]** keys may be used to scan up and down the picture.

When you have finished looking at the picture press **[Stop]** to return to the normal spreadsheet display. If you type **[T]** again you will see that you can also trace to printer. This offers the option of normal or high quality output. The printing of graphs from the spreadsheet will only work on Epson compatible printers. Specifically, the printer must support ESC K for normal output and ESC L for high quality output.

Graph functions

Here are the functions that are used to define what you want to plot. This is followed by a description of how they are actually used:

Note that where *crd* is specified in the functions below you must put it in the form shown. If you don't the current values may not be properly passed to the plotting section of the program. You can't use numerical or expression equivalents except where stated.

TYPEPLOT(*crd*)

All charts must include this function before you try to trace them. This function is used to define the type of graph or chart plot you want. Give a value between 1 and 18 in the cell referred to by this function. If, for example, you want a Pie Chart use the function TYPEPLOT(A1) and put the value 6 into cell A1. Do not try to use TYPEPLOT(6).

Business graphs

Use TYPEPLOT values 1..6 as described below. (these graphs require TIMELABELs rather than actual XVALUES, this is explained below)

1. Bar chart (histogram) - there may be more than one bar over each time label
2. Stacked bar chart - each bar for each time label is superimposed over the others so that only the overlap is shown
3. Line chart - lines join each point on each of the plot categories

4. Area chart - as above but the enclosed area is hatched.
5. Hi-lo chart - each of the plot categories are shown as a marker above each time label. The markers are joined by a vertical line.
6. Pie chart - the familiar segmented circular chart.

Statistical, Scientific and Engineering

Use TYPEPLOT values 7..18 as follows. For all these types of chart you must give x and y coordinate pairs using XVALUE and YVALUE.

7. X:Y line joining points
8. LogX:Y Line joining points
9. X:LogY Line joining points
10. LogX:LogY Line joining points
11. X:Y points only
12. LogX:Y points only
13. X:LogY points only
14. LogX:LogY points only
15. X:Y points and Line of Best Fit
16. LogX:Y points and Line of Best Fit
17. X:LogY points and Line Of Best Fit
18. LogX:LogY points and Line of Best Fit

MAINTITLE(*crd*)

The cell co-ordinate is a pointer to a text cell where the main title is to be found. The use of MAINTITLE is optional. If you don't use MAINTITLE, the title area of the chart will just be left blank.

SUBTITLE(*crd*)

The same idea as for the MAINTITLE applies to the SUBTITLE. This is printed directly below the main title in a slightly smaller font.

YTITLE(*crd*)

Where *crd* identifies a cell of text format holding the title to be written up the Y axis on the left hand side. YTITLE is not used for the Pie chart (TYPEPLOT 6). Use of YTITLE is optional.

XTITLE(*crd*)

Where co-ordinate *crd* refers to a text format cell where the X title is. The XTITLE is the one across the bottom of the graph. XTITLE is not used for the Pie chart (TYPEPLOT 6). Use of XTITLE is optional.

XLABEL(*crd...crd*), or XLABEL(*crd*, *crd*, *crd*, etc.)

This points to the text cells containing X labels which are the legend box items on the right of the chart explaining what the plot lines/bars etc. refer to. The spreadsheet also uses this function to discover how many plot lines/columns you want to display so you MUST include the XLABEL function.

Unlike the other functions in this list, the range can also be a list of individual items, each one pointing to one of the X labels.

Please make an effort to get the number of X labels correct as the program counts them to see how many lines or groups of items there are. If, for example, you get it wrong and enter too many Xlabels you will be informed there are Y values missing because it is expecting to have to draw further lines.

All types of chart *must* have an XLABEL function. It is not optional.

TIMELABEL(*crd...crd*)

The time labels are the tagged items on the X or bottom axis that show what exactly is being plotted on a business chart. They are not always time labels but it is very common in financial graphs for example to plot values according to month or year. This function is only used with plot types 1...6; the other graph types will expect actual numerical values on the lower line - given by the XVALUE function. For plot types 1..6 there MUST be a TIMELABEL function. If you don't actually want time labels, then just point the function to cells containing a single space character (they must not be completely blank).

YVALUE(*n*, *crd*, *crd*)

This function points to the actual Y values to be plotted. The '*n*' refers the number of the plotting line to which the values apply. There will be one of these functions for each line. All types of chart make use of the YVALUE function.

YMAXIMUM(*crd*)

The *crd* in this case can be a value or a reference to a value that specifies the maximum figure to be shown on the Y axis. Your choice will be rounded to a suitable nearby value to improve the presentation. Use of YMAXIMUM is optional. If it is not used the upper limit on the Y axis will be the same as the largest Y value.

YMINIMUM(*crd*)

This is a similar function to the above for a minimum value.

Note that because the Notebook spreadsheet rounds the value for the minimum to the best nearby value to give an attractive display, you may have to experiment and perhaps set the YMINIMUM value lower than you first thought in order to get the desired display.

XVALUE(*n*, *crd*, *crd*)

This function points to the actual X values to be plotted. The '*n*' refers the number of the line to which you are referring. There will be one of these functions for each line. XVALUE is only used for plot types 7...18, the TIMELABEL function is used for plot types 1...6

XMAXIMUM(*crd*)

The *crd* may be a value or a reference to a value that specifies the maximum value to be shown on the X axis. Your choice will be rounded to a suitable nearby value to improve the presentation. (plot types 7...18 only)

XMINIMUM(*crd*)

Similarly for a minimum value. See the notes given above for YMINIMUM. The XMINIMUM command only works on plot types 7 or above.

Remember that because the graphics commands are entered as **FUNCTIONS** followed by values or co-ordinates each of the above should be placed into a cell that has been given a numerical format, even though the information they refer to may be text. The text itself of course has to be placed in cells of a text format.

You may be wondering what each of these cells that contain the above functions will actually display on the screen. In the majority of the cases the display will show zero. Some of the functions will display a numeric value if it is felt to be useful. For example the cell that contains the **XLABELS** function will show the number of Xlabels defined - that is, the number of sets of data to be plotted. The cell that contains **TYPEPLOT** will show the number of the graph type chosen.

Making a graph in practice

Business type

In a business type of graph you just have one or more sets of **Y** values that are to be plotted at discrete intervals along the **X** axis. You do not specify actual **X** values, the first point is plotted in column 1, the next in column 2 and so on. You can, however, define "time labels" which are text labels to be placed on each discrete **X** position. The following shows how you can make a business chart. Here is some sample data that we might want to plot:

Rainfall

	Jan	Feb	Mar	April
1992	23	27	18	30
1993	17	6	26	24

Prepare a sheet with this data that you want to plot. The actual data values can be up and down columns or across lines, as long as they lie in a range of co-ordinates. One obvious way to set out this data would be exactly how we have written it above. All the labels (including 1992 and 1993) are entered into text format cells - start entry with **"** to use the global text format.

The numeric values are entered into general format cells using **"** to start entry:

A1 RainFall J200
 TxtL ABCDEFGHIJKLMNOPQRSTUVWXYZ!+-V>.(/*†++ 32361
 Next: Auto.

	January	February	March	April	
1992	23	27	18	30	-
1993	17	6	26	24	-

In addition to the actual data and labels we will need some functions to tell the spreadsheet what is to be plotted. It is not critical how the other items are laid out so just set aside an area to put in the plotting instructions. Each of these instructions is a pointer to where the particular data items you want displayed are to be found.

Start by putting the TYPEPLOT function into cell A6. Remember that you must include a cell reference in the TYPEPLOT function, such as **TYPEPLOT (A5)**. Don't just use TYPEPLOT(number). Once you have put in the function to define the type of chart, you can then put in pointers to the various titles, although these are optional. These are MAINTITLE, SUBTITLE, YTITLE and XTITLE. In this case, just enter **MAINTITLE (A1)** into cell B5. So far you may have something like the following:

	January	February	March	
1992	(23)	(27)	(18)	-
1993	(17)	(6)	(26)	-
(1)	(1)			-
<2> (TYPEPLOT(A5))	<1> (MAINTITLE(A1))			-

Next you must tell the spreadsheet which cells contain the time labels using the TIMELABEL function. Remember, these are typically the months or years that go across the bottom of the page, as in this example, but they don't in fact have to relate to time but usually do. In this case enter **TIMELABEL (B2...E2)** into cell B6.

For each position on the time axis we have two sets of data to be plotted, the values for 1992 and those for 1993. You must use the LABEL function to give a name for each set of data that is to be plotted. These labels will be used to print the key that appears to the right of the graph. The spreadsheet also knows that there are two sets of data to be plotted when you use this function. It cannot be omitted or the spreadsheet would not know how many sets of data there were. In cell C5 enter **XLABEL (A3...A4)**.

Lastly use the YVALUE function to point to the actual sets of data to be plotted. There will be one YVALUE entry for each set. In D5 and D6 enter **YVALUE(1,B3...E3)** and **YVALUE(2, B4...E4)**. You should have something that looks like the following:

	January	February	March
(23)	(27)	(18)	
(17)	(6)	(26)	
<5> (MAINTITLE(A1))	<3> (XLABEL(A3...A4)	<1> (YVALUE(1,B3...E3)	
<4> (TINELABEL(B2...E2))		<2> (YVALUE(2,B4...E4)	

If you particularly wish to specify the maximum or minimum values you want plotted then use the YMAXIMUM and YMINIMUM functions. Normally don't use these functions as the program will work out all the maximums and minimums for you automatically.

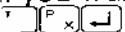
The only thing that remains is to actually instruct the spreadsheet to plot the graph. You do this by using the Trace graph to Screen (or Printer) command. Type **[F5]** to start the plotting process. Your current worksheet will be stored in the RESTART.MEM file and there will be a short delay while the spreadsheet works out how the graph is to be drawn. The screen will clear and a small version of the graph will be drawn to fit as best it can on the Notebook's 16 line screen. This will give you an overall feel for how the graph will look when printed.

You may want to see the picture in more detail and so it is possible to press the **[Word]** and **[Main]** keys to get the spreadsheet to switch between this small version and an enlarged version of the picture. In the enlarged version you can then use the up and down arrow keys to move up and down the picture. Press the Space bar when you have finished looking at the on-screen chart. You will then be returned to the normal spreadsheet screen and your worksheet is reloaded from the RESTART.MEM file.

As mentioned above, the example file, PLOT1 contains a worksheet to produce a business plot. It is probably worth loading this file to see another example of the plotting instruction being used. Remember that you can use the **[X]**-eXchange command to switch the display to showing the formulas.

Try using the **[F5]** command on PLOT1 to see what it looks like. You could try changing the value held in cell A1, which is the **TYPE**

of plot. Use any number between 1 and 6 to see the various types of business chart available.

If you want to print a chart on your printer you use the command . You are then asked whether you want to print it in normal or high quality. The former is quicker but the latter will give better results.

NOTE: The printing of graphs will only work on Epson compatible printers that support the ESC K and ESC L sequences for printing graphic data. If you are using a laser printer, see if it can be switched to emulate an Epson type of printer before attempting to print any graphs from the spreadsheet.

Pie charts

The first 5 types of business graph are all built in the same way. You have a TYPEPLOT to select the plot type. XLABEL identifies the labels for the "key" to the graph and also tells the spreadsheet how many lines/columns are to be drawn. The YVALUE function is used to tell the spreadsheet where each set of data is located. TIMELABEL gives the legends for the X axis. In addition to these you may also, optionally specify MAINTITLE, SUBTITLE, YTITLE, XTITLE, YMINIMUM, MAXIMUM.

Pie charts are just a little different as the following example will show. In this case the aim is to show a set of data as fractional parts of a circle. Let us assume that we have the following figures to plot:

Computer Sales

Handheld	80,000
Notebaak	55,000
Portable	112,000
Desktop	285,000

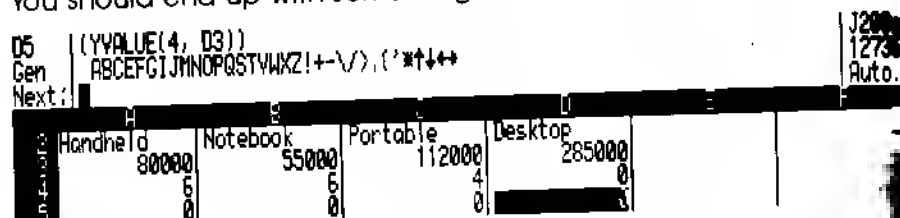
Enter this data onto a blank worksheet as follows:

Computer Sales						J2000 32300 Auto.
Handheld	Notebaak	Portable	Desktop			
80000	55000	112000	285000			

You must use TYPEPLOT to request plot type 6. Enter the value 6 into cell A4 and the **TYPEPLOT (A4)** function into B4. Each segment of the circle must have an XLABEL so in cell C4 enter the function **XLABEL (A2...D2)**. Although it is not used for anything other than a title on the chart, you must also have a TIMELABEL function. So put a **TIMELABEL (A1)** function into cell D4.

All that remains is to tell the spreadsheet where the data to plot is located. Each segment is a separate YVALUE so you must have separate YVALUE functions for each segment. In A5 enter **YVALUE (1, A3)**, in B5 enter **YVALUE (2, B3)**, then **YVALUE (3, C3)** and **YVALUE (4, D3)** in cells C5 and D5.

You should end up with something like this:



All that remains is for you to type the command to see the result. Remember that the and keys may be used to switch between the full page and magnified view. In the magnified view you can scroll up and down the picture using the and keys.

Scientific graphs

Unlike the business types of plot, the scientific charts require you to give (x,y) co-ordinate pairs for the points to be plotted. In this case you do not use the TIMELABEL function. Instead, you specify a set of XVALUES in the same way as YVALUES

An example will probably make this clear. Say, for example, that you want to produce a chart with two distinct lines on it. For each line you will give four points as follows:

- Line 1: (3,4), (7,2), (9,8), (10,12)
 Line 2: (2,7), (5,9), (8,2), (11,3.5)

Enter these data values onto a blank sheet as follows. The entries in cells A1 and A3 will be used as the XLABELS on the chart to identify the two lines.

A1	Line 1								J200
Text	ABCEFGIJMNPQRSTVWXYZ!+-\>.(/*!+&								32301
Next									Auto
1	Line 1	3	7	9	10				
2	Line 2	4	2	8	12				
3		2	5	8	11				
4		7	9	2	3.5				










As before you need to use the TYPEPLOT function to tell the spreadsheet how it should plot the data. For this example we will initially use type 7 so put the value 7 into cell A5 and the function **TYPEPLOT (A5)** into cell B5.

You must also tell the spreadsheet where it should find the Xlabels. Put the function **XLABEL (A1, A3)** into cell C5. As well as telling the spreadsheet where to find the labels, this has the secondary effect of telling it that there are two sets of data. The cell displays the value 2 to remind you how many sets of data the spreadsheet thinks there are.

All that remains is to let the spreadsheet know which cells contain the data points. Put the following functions into the following cells:

- VALUE (1, B1...E1) in cell A6
- VALUE (1, B2...E2) in cell B6
- VALUE (2, B3...E3) in cell C6
- VALUE (2, B4...E4) in cell D6

You may now use the    command to see the result on the screen. It looks a bit sparse and you may like to add some of the following: MAINTITLE, SUBTITLE, XTITLE, YTITLE for a professional looking result.

Remember, if you would like to print a copy of the chart use an Epson compatible printer and give the command      or    .

You can use these random sets of data points to see one further facility offered by the spreadsheet. Change the plot type number, cell A5, to 15. This selects an X:Y chart with lines of best fit. This time, when you plot the chart, instead of the points just being plotted, a straight line that best fits the given data points will be drawn. The key at the side of the graph will show the calculated equation of the two lines in the form $y = m \cdot x + c$. (The "" is used to mean "times").

Further points about chart plotting

If you do any EDITING of the plotting instructions or make any changes that do not force a recalculation, you may end up with an error message or values that do not seem to be true. This is most likely when you use direct values in your functions rather than cell co-ordinates.

An example may be:

YMAXIMUM(20000)

and a case where it would not occur would be:

YMAXIMUM(B7)


Don't worry about this, just remember the safest way to handle plotting functions that do not contain cell references is to overwrite them rather than edit them.

The instructions for plotting are updated when a recalculation is done, so if you have made changes the latest instructions may not have been passed causing an error. If you get such an error message just use the ! force recalculation command and try the plot again.

Tutorial XVI - Automating Data Manipulation

Using macro command groups



Often you will want to go through the same set of commands repeatedly. A typical example is the changing of the format of all the cells in one column. This can be both time consuming and tedious. To get round this situation you should use the * macro command. A macro is a computing term that you will come across in many programs. You may already be familiar with macros in the word processor. A macro is just a sequence of key presses that you can easily recall to save you a lot of typing.

The Notebook spreadsheet will let you create predefined sets of linked commands. Just enter the command letters into a text format cell as if you were actually typing them in to be acted on immediately. Where you would want to use a  enter the @ symbol instead.

To call the macro to perform these commands you only have to type * followed by the co-ordinate reference to the cell in which the macro is stored. So *A1 calls the macro in cell A1. The maximum size of a macro is limited but you can put your macro in more than one cell by finishing with a reference to the continuation macro. For example you might finish your A1 macro with a reference *A2 to force it to continue with the commands entered in A2.

If you want your macro to loop and be carried out repeatedly then finish it with a reference to itself. For example with cell A1 this would mean finishing with *A1. Don't worry about this causing an endless loop, there are lots of ways of making the macro come to an end.


In an illustration the following example takes a column of numbers in financial format and changes them all to one place decimal format.

Load the demonstration file called SALES.MEM. If you have just started the spreadsheet type the following - SALES.

A1 COMMISSION CALCULATION C18
 TxtR ABCDEFGIJMNOPOSTVWXZ!+-\>.(/*+> C18
 Next: Auto.



COMMISSION CALCULATION		
	Sales	Commission (%)

Start by moving the cursor to cell A2 where the macro is to be entered. Type " to get into text entry mode and then type **NF1D@D*A2@** which says 'New Format one place Decimal, carriage return, cursor Down and finally do macro A2 again'.

The @ symbol stands for the  carriage return.

A2 NF1D@D*A2@ C18 c
 TxtL ABCDEFGIJMNOPOSTVWXZ!+-\>.(/*+> C18
 Next: Auto.


COMMISSION CALCULATION		
NF1D@D*A2@	Sales	Commission (%)

Next move the cursor to the location you want the macro to store its operations. In this case it is cell B5 so type  B5 to move quickly to that cell. Now type ***A2** to start the macro going.

B11 ----- C18 c
 TxtR Text/Value change 31991
 Next: Auto.

	10000.0	10.00
	20000.0	20.00

The commands will then work their way down the column. But, as you will see, a macro is brought to a stop by any error message.

You can see that the macro has come to a stop on cell B11 because it is not possible to change a text format cell to a numeric format. You see the message **Text/Value change**. Just type  and your looping macro operations will be completed and you will be in a position to go onto your next command.

A macro differs from a subroutine function, which you will learn about next, in that it is a list of direct commands rather than functions - the macro can contain a command such as NF for New Format, which is something that cannot normally be entered into a cell as part of an expression. The subroutine, on the other hand, allows one that performs normal expression functions repeatedly.

It is of incidental interest that if you were to restrict your macro definitions to the first 9 cells of column A they could be accessed by just typing *1,*2 etc. Move to cell C5 (type **C5**) and then type *2 to see this in operation. This time the macro comes to a stop when an attempt is made to change the format of a blank cell - the NF command only works on cells that already contain data.

Functions that allow looping

Sometimes it would be very useful if you could use a few formulae repetitively to work towards an answer. For instance when working out the internal rate of return example given in the demonstration files (the file called IRR.MEM), a short entry has been set up that tries a range of possibilities and stops at the nearest.

The functions that allow you to do these repetitive calculations are often referred to as loops. The Notebook spreadsheet provides you with two functions, **DO** and **WHILE**, designed to make the setting up of loops very easy.

Unlike the IF, THEN, ELSE example seen earlier the command word **DO** is not followed directly by an expression but rather by a reference to a range of cells that contains the desired expression. This saves you a lot of typing if your calculation is long and complex.

Note that you must specify a RANGE, so your working must be in one line or one column and not in a block. However, the function looks at the range and finds the highest and lowest order of calculation number and then all those entries between the numbers are recalculated no matter where they are in the sheet. It does not matter if some of your intermediate calculation numbers are not in the specified range as they will still be correctly calculated.

To use a loop enter the **DO(range)** function which performs the desired calculation followed by a comma then any other

expression or function that you wish. Usually this second function will change a value somewhere that acts as a loop counter (counts the number of times that the calculation has been done).

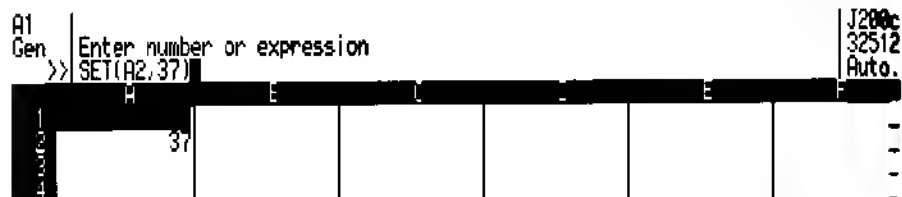
There are several related functions that make setting up a counter easy for you namely **INIT**, **SET**, **INC** and **DEC**. These respectively initialise a cell entry, assign a value to a cell entry, increment a value (increase by one) and decrement a value (decrease by one).

After the loop counter section you should type in a further comma and then use the **WHILE** function. This function has a logical argument such as a logical expression finding whether the loop counter has reached a certain value, often zero. If the **WHILE** function is **TRUE** then the cell formula is started again at the **DO** and repeated to the **WHILE** until the **WHILE** becomes **FALSE**.

That is a basic description and it will seem fairly complicated at this stage. Do not worry about it yet, follow through the examples and then go back and look at this section again.

First, you are going to look in more detail at how the **SET** function works. It is of the form **SET(coord, value)**. The value can also be an expression and can also include the referenced co-ordinate. **SET(A2, A2+1)** is valid and works in exactly the same way as **INC(A2)**. The **SET** command works in a similar way to entering a constant value into a cell using the entry command, except that the value is entered as a result of the expression rather than directly by you. It is therefore a useful way of automating the entry of cell constants and ensuring that the value will be updated if the referred cell values change.

If you think about it, **SET** is a way of filling one cell with a value whilst you are entering an expression into another cell. Try entering the function **SET (A2, 37)** into cell A1 of a blank sheet. Don't press **↵**.



You may note that the destination cell is set even before the expression is fully entered.

If you decided to press at this stage, to end the expression entry, the actual cell that contains the SET function (A1) would itself take on the value shown in the distant cell that has been set. This is primarily because it hasn't been shown anything else to display rather than for any logical reason.

Next see how the **INC** increment function works. This is not a particularly useful expression by itself but you will see later how it can form an important part of a DO WHILE loop. After the SET function that you have already typed continue with **,INC(A2)**. Once again, the function works even before the expression is completed, so as you enter the formula you will see A2 first had the value 37 and then 38 as it is incremented.

A1	Enter number or expression					J200c
Gen	>> SET(A2,37), INC(A2)					32512
						Auto.
	A	B	C	D	E	F
1	38					

Now although you are manipulating the values that are held in cell A2 don't forget that your current cursor position is still A1 and that it is into A1 that you are entering your expression.

Remember that A1, i.e. the current cursor position, will take on a value that is calculated from the expression or function after the last dividing comma in your expression list.

You can therefore put a further comma in and then an expression or value that doesn't manipulate A2 such as **2*A2** . You will see that A2 now contains 38 and A1 shows the value 76 which is 2*A2.

The effect of dividing commas is to cause an effective restart as if what follows was at the beginning of the entry line. You should understand that only functions like SET, INC and DEC have any actual effect on the worksheet if there is a later dividing comma, i.e. they act on cells other than the current one, so a restart does not alter the values that these cells have assumed:

A1	{SET(A2,37), INC(A2), 2*A2}					J200c
Gen	ABCEFGIJMNOPQSTVWXZ!+-*/>,<(')*↑↓++					32452
Ext:						Auto.
	A	B	C	D	E	F
1	76					
	38					

In this case the entry at A1 has ended up with the value $2 \times A2$ which is 76. The cell entries as a whole have become a series of instructions executed in turn.

Subroutines using the DO function

As well as being a part of a loop the DO function can be used without the WHILE to act as a call to a subroutine that is only executed once every time it is called.

You may be familiar with subroutines but if not, here is an explanation.

A subroutine is a group of formulae which you may want to use repeatedly. Rather than enter the formulae many times over you simply have to type them in once and access them with the DO function. You will see the similarity here with a macro command. Every time the subroutine function is found in a cell during recalculation the whole of the group is calculated again. Now have a look at it in practice:

Start with a blank sheet and enter the formula $2 \times A4$ into cell A3. A line of question marks appears because the formula in A3 is waiting for you to input a value into A4. In cell A1 enter the following: **SET (A4, 5), DO (A3...A4)** . When you type the closing parenthesis of the set command the value 5 appears in cell A4 but the result (in cell A3) does not appear until you press .

The same function ($2 \times A3$) could be used several times to double values from all over the sheet. Each time the "subroutine" is called you just pre-load A4 with the parameter to the function and then use DO to execute the function in A3.

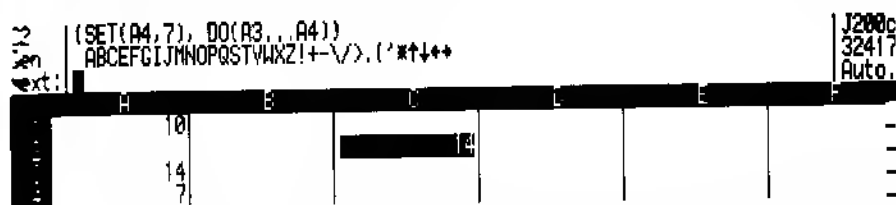
Note that although you only want the function in A3 to be recalculated, the argument of the DO function MUST be a range; it cannot be individual entries (although it can be just two, one of which is blank) or a block. However, this is not as restrictive as it may sound because the DO function will calculate a complete sequence of formulae. Each cell in the range you specify will have an order of calculation number. The DO function will find the one that has the lowest number and the one that has the highest.

As each function is calculated in turn, every cell in the sheet that falls within the bounds of these two calculation numbers will also be automatically recalculated. This means you will get the effect

you want provided your range includes the start point you want and the end point you want.

When you call a subroutine like this you can make sure the result is copied into the calling cell by following the expression by a comma and a reference to the cell that has the answer, in other words by effectively resetting the expression you have typed and by copying the value of the answer cell into the current cell.

Now you can try using the subroutine group we have set up to multiply 7 by 2. To illustrate that you can call the subroutine from anywhere in the sheet you can do this in cell C2: Enter **SET (A4, 7) , DO (A3 . . . A4) , A3** into cell C2.



Note that the cells that contain the subroutine are also changed as well. Thus you end up with 14 in cell A3 as well as in C2. Because of this, it is as well to keep the subroutine cells well out of the way of the rest of the sheet.

The group used for subroutines calculation should not be referred to by the main body of the worksheet other than as a subroutine call or it can give nonsense values. You are, after all, changing the constants in it several times during the calculation.

You can change the cell values with SET commands before each DO function.

This is a trivial example but the same technique can be used for much larger sections of the worksheet.

Looping using functions DO and WHILE

Now we are going to look at how to use the DO and WHILE functions in conjunction in order to build up a repeating loop.

Our first job when setting up a loop is to set aside a cell to act as a counter to keep track on how many times the loop has been performed. Do this with the **INIT** function.

The **INIT** function is almost identical to **SET** but the target cell will be given a very low order of calculation number and hence you can be sure it will be re-calculated early on in every forced recalculation. This is important because every time you run the loop **INIT** makes sure that the counter is reset to its original value. Using **SET** in these circumstances may mean that the counter cell increases in value after the loop is used once and the condition tested for by the **WHILE** function may never be met.

Blank the sheet and then put the function **INIT(A2, 0)** into cell A1:

A1	(INIT(A2,0))	J200c
Gen	ABCEFGIJMNOPOSTVWXZ!+-\/>.('*↑↓↔	32477
Next:		Auto.

In this case the counter cell is A2. The object of this example is to multiply the value of the counter by 2 and then increment the value and do it again. A criterion for stopping will be specified.

Here a reference to the counter is placed in A5:

A5	(A2)	J200c
Gen	ABCEFGIJMNOPOSTVWXZ!+-\/>.('*↑↓↔	32464
Next:		Auto.

At this stage it has the value 0. The expression **2*A5** is entered into cell A4:

A4	(2*A5)	J200c
Gen	ABCEFGIJMNOPOSTVWXZ!+-\/>.('*↑↓↔	32449
Next:		Auto.

The counter and formula are now set up so the loop can be established: In cell A3 enter **DO(A4...A5), INC(A2)**. **WHILE(A2<10)**. This is just like the previous example of **DO** but now we have added an extra **WHILE** function to the end.

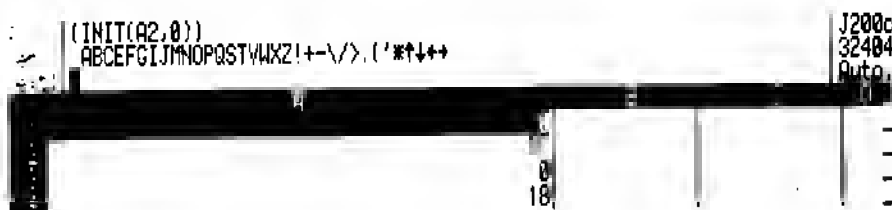


Each time you press ! to force a recalculation. You will see A5 count from 0 to 9 and A4 (the result) will count up in steps of two.

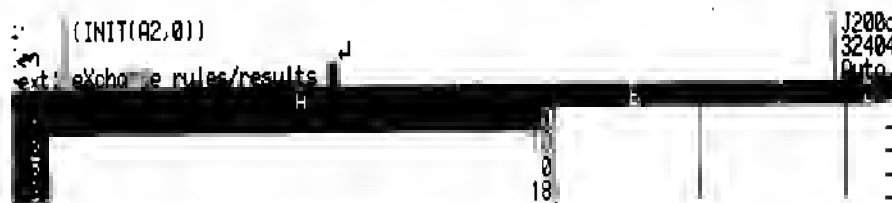
The heart of the loop is the WHILE function which has the special property that if the logical argument that follows it is TRUE then the expression is wound back to the DO and repeated. In the example it remains TRUE while A2 is less than 10. But note that after the DO function the counter A2 is incremented. The multiply by 2 formula therefore has a different start value. Overall the effect is that on the screen you see A5 going from 0 to 9 while A4 goes from 0 to 18. Not a lot of use in this case but it shows the loop working 10 times. Later you will see the looping used to fill a table.

Reminder:

To make it easier to see the rules of the spreadsheet you can convert the display to show just the formulae. Let us try this now. First the column width needs to be increased, type



Then the ☐ for eXchange command is used:



A1	(INIT(A2,0))					J2008
Gen	ABCEFGIJMNOQSTVWXZ!+-\>.(/*+>+					2011E
Next:						Auto
	H	E	C			
1	(1) (INIT(A2,0))					-
	(set)					-
<4>	(DO(A4...A5), INC(A2), WHILE(A2<10))					-
<3>	(2*A5)					-
<2>	(A2)					-

You can now see all the formulae. The number in front of the formula is the order of recalculation number.

The way the looping is organised means that the DO formulae will always be calculated once before the WHILE is tested. This ties in with the way DO and WHILE work in the main computer languages. If this is not the way you would like the loop to work you can precede it with an ordinary IF THEN logic test.

Note: It is NOT possible to have a DO-WHILE loop within a DO-WHILE loop.

Table filling using the DO function

Because it provides an automatic method for filling cells with values, the SET command is useful for creating tables within the sheet.

You are going to see how to fill a table with the values of SIN(x) between 10 and 90 degrees. As before, you start by initialising a counter to keep track of where you have got to in the table. In this case cell A2 is set up with 1. Blank the sheet and enter **INIT(A2,1)** into cell A1

As you want the sine values every 10 degrees you can use the counter multiplied by 10. This formula is inserted in cell A3 as **10*A2**

Now you have a value for degrees you can refer to it with a SIN function in cell A4. Enter the formula **SIN(A3)** into that cell.

A4	(SIN(A3))					J2008
Gen	ABCEFGIJMNOQSTVWXZ!+-\>.(/*+>+					3243
Next:						Auto
	E	C				
1						-
2	10					-
3						-

The object is to fill a table in column B with the sine values at every

10 degrees. Somehow you must transmit the calculated value to the required slot. Once more you can use the SET function but together with the **CRD(col, line)** function rather than a specific co-ordinate defined when you first enter the function.

CRD is another special function that we have not discussed before. It can be used anywhere you would use a co-ordinate reference it is typing directly. The two arguments are calculated to be a column and row number which are combined to make a cell reference.

In A5 enter the expression **A4, SET (CRD (2, A2), A4)**. This expression starts with **A4**, to ensure that it is not calculated until the result of **A4** is known. It will get an order of calculation number higher than that for cell **A4**.

The CRD function is of the form **CRD(column, line)**. In this case the column number is 2 which is column B. The line number is the value in **A2** which is 1 at present. The CRD function will therefore become the cell reference in **B1** and will behave exactly as if the entry read **SET(B1, A4)**. As you can see the cell **B1** has already been set to the value of **A4**.

A2 is a counter and can be made to change in value by using a DO function. As **A2** changes so will the CRD function give different cell references. In this way we can fill a column of cells with values and form a table.

The next step is for you to enter the DO - WHILE loop. In **A7** enter **DO(A3..A6), INC(A2), WHILE(A2<10)**. **A6** has deliberately been left blank for the moment. The sheet will then look like:

1	(DO(A3..A6), INC(A2), WHILE(A2<10))	J2000 32366
2	ABCEFGIJMNOPQSTVWXZ!+-\>.('*!++	
3		
4		
5		
6		
7		
8		
9		
10		

the editor a recalculation is performed and this time column C is filled with the SIN values.

All that remains is to add another SET function to fill up column B with the degree values which are calculated in cell A3: This must be in the range of cells executed by the DO function so we will use cell A6 which was left blank. In that cell enter **A4, SET(CRD(2,A2),A3)**. Once again, the actual SET command is preceded by a reference to cell A4 so it is not executed until that cell has been calculated. You could now press **!** - this will force a recalculation to give the tables you want:

	B	C	D	E	F
	10	0.173648178			
	20	0.342020143			
	30	0.5			
	40	0.64278761			
	50	0.766044443			
	60	0.866025404			
	70	0.939692621			

The SET command has one drawback compared to entering all of the values manually. The Notebook spreadsheet is not always able to allocate order of recalculation numbers to the cells that it itself has set. The next example will illustrate how this can cause some minor problems.

You are going to use the tables in columns B and C to interpolate a value for 25 degrees. You should enter the **INTERP** function in the following form to get the value you want. In cell A9 enter **INTERP(25, B1...B9)**

But this does not work as an error message about an ambiguity comes up. This is because you are trying to operate on a calculated table and the spreadsheet cannot resolve just exactly what calculation number to give your new entry relative to the table:

You can solve this problem by first putting a reference to the cell that created the table. In this case it was the DO function cell, so you have to put A7 before your INTERP function. That is: **A7, INTERP(25, B1...B9)** . It may not be logically obvious but this is a way of telling the spreadsheet that your new function should have a calculation number greater than that of the DO function. It was for this reason that you had to include the reference to A4 before the two SET commands in cells A5 and A6.

Switch to the display of formula with the \boxed{x} command and note the DO function has a calculation number of 6 and the INTERP follows it with 7 so the attempt to interpolate is only made once the DO function has finished and the ambiguity no longer exists.

1000-10000-4-03	$\langle 2 \rangle$ (10*A2) $\langle 3 \rangle$ (SIN(A3)) $\langle 5 \rangle$ (A4, SET(CRD(3,A2),A4)) $\langle 4 \rangle$ (A4, SET(CRD(2,A2),A3)) $\langle 6 \rangle$ (DO(A3...A6), INC(A2), WHILE(A2<10))	6 (set) (set) (set) (set) (set) (set)	(set) (set) (set) (set) (set) (set)
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If you use the X command you can switch the display back to see the result of the interpolation which gives value exactly half way between the sine of 20 and the sine of 30 as you would expect. This is just a linear interpolation. The actual value of SIN(25) is 0.42262 but the INTERP value is close.

Limitations of CRD()

The CRD function should only be used with INIT, SET, INC and DEC to specify the cell to be acted upon. It cannot be substituted in every instance where you would normally specify a cell co-ordinate directly - it is only a pointer, not a receiver of data.

It can not be used to give the value of a cell if used in arithmetic expressions. It cannot be used, for example, in an expression such as $2 + \text{CRD}(1,2)$ instead of $2 + A2$.

There is an automatic function that will do this which is the VAL or value function which returns the current value of the cell to which it refers. The arguments are formed in the same way as for the CRD function. So, for example, if A2 contains 3 the expression $2 + \text{VAL}(1,2)$ will give the answer 5.

Iterative solutions - using circular references

As mentioned in the opening sections of this manual most spreadsheets will get very confused if you try to enter formulae that refer to each other in a circular way e.g. making A1 equal to $2 * B1$ and B1 equal to $3 * A1$.

The Notebook spreadsheet is more broadminded about such things, indeed not only will it let you set up such circular references but, if correctly done, they can be a powerful problem solving tool.

By setting up circular references to problems that are resolvable you will see that the spreadsheet makes an estimate about the values that belong in the cells in question.

If you then force repeated recalculations then this estimate moves closer and closer to the correct solution until an answer is found. This is known as an iterative method of problem solving.

Such repeated calculations can profitably be automated using a DO WHILE function.

Consider the next practical example.

Solving simultaneous equations

Simultaneous equations can be solved easily using the Notebook spreadsheet. The technique applies equally to awkward equations with the unknown you are seeking on both sides of the equation.

The principle is quite simple. You prepare a set of formulae for the answers as if all the other variables have known values. They don't because each formula depends on the results from the others. These are known as circular references.

When the last formula has been entered you force a recalculation and each formula uses the latest results available. This improves the result that each calculates. Further recalculations bring the calculated results nearer to the true results. This is a powerful technique that is often used for programmed solutions to equations. The difference is the formulae you enter are simple in comparison and you are fully in control of the solution. You can even automate the solution using the DO WHILE functions.

Here is an example for two equations and two unknowns. It is trivial but that makes it easier to see the principles.

The equations are:

$$2x + 3y = 19$$

$$x + 7y = 25$$

You enter them onto the sheet using the constant multipliers of x and y and ignore the values of x and y themselves, i.e. in the form:

2x + 3y = 19


SPREADSHEET GUIDE - PART THREE

Overview of Spreadsheet Functions and Re-cap of Tutorials

This section can be read by all new users of the Notebook spreadsheet who have some previous experience of spreadsheets as a substitute for the tutorial guide. It is designed to give you a quick grounding in the way the Notebook spreadsheet operates and to ensure that you understand the philosophy behind the use of the various sections of the program. It is not intended to cover all the features of the program but you should be able to obtain pointers to where you will find more detailed information.

We must ask you to be patient during the explanation of what may be obvious points. Although much of the Notebook spreadsheet will be familiar, and will even use the same command names as other programs, you will find some features that go far beyond the abilities of any other sheet. It is well worth persevering to be sure that you appreciate all of the possibilities.

The Notebook spreadsheet's Dynamic Data Entry and Error Checking features

The Notebook spreadsheet has a unique system of dynamic prompting and error checking that provides you with full details of every possible command you can enter at any stage. Commands are input as one-letter mnemonics but if space permits, a full explanation of all the permissible entries is shown on the prompt line as you type. More extensive help can be obtained by pressing the  key.

At the same time as you are entering the data the Notebook spreadsheet evaluates the results of the commands, as far as they have progressed, as you type. Any mistakes that you make will be immediately painted out to you.

If cell data that has been referred to by an expression is missing from the sheet, the calculation is performed assuming a value of zero, but you will see a row of question marks appear in the display to show where there is some data missing

The continual recalculation feature can be switched off if desired and indeed this may be advisable if you are entering any long and time consuming loops in the formula.

In normal circumstances both the prompts and the constant calculation are useful safeguards against error; there can be no ambiguity over exactly where a mistake has occurred.

See the section More Details on Error Messages if you are still unsure what has gone wrong.

At all times the **[END]** key will take you back to the previous step in the entry process. Mistakes are thus easily corrected. Pressing **[END]** will take you back to the primary command options available.

The only exception to the above situation is when you are using the EDIT option to make changes to cell data or a formula that already exists. In this case no prompting or error checking is performed until there is a recalculation. It is often safer and easier to simply re-enter new data into the cell.

The spreadsheet and its uses

The Notebook spreadsheet is designed to use the available memory space of your Notebook to the full. The size of the sheet can be anything up to a maximum of 52 columns, labelled A-Z then a-z, and 255 rows, and no matter what size you define it no memory is used until you start to enter data.

However, the number of cells that can contain data is limited by the amount of free memory in your Notebook. The amount of data you can enter is difficult to predict accurately because it depends on how complex the expressions you enter into each cell are. You can keep track of the remaining memory which is shown by the figure towards the top right of the screen. Although the Notebook spreadsheet will not allow any of your work to be lost, it is as well to plan in advance whether a large project will fit in one sheet or have to be split into two.

When you first start you have two options for setting up a worksheet

- 1) By using the Make sheet command you can instantly set up a blank sheet in which the choice of columns, column sizes, formats, etc. are made for you. This is great if you just want to quickly try out some numbers and see what happens.

- 2) Alternatively, if you want more control of the number and types of cells created then you can define all these things individually. Before you can enter any data into the spreadsheet you have to first define the depth and width of the sheet. The size of the sheet is set by using the Insert command to add the required numbers of Columns and Lines. The display width of each column is also set at this stage, although it can be changed again at any time.

You are also asked to specify a default display format for each column that you enter. This will only affect how the data you enter is displayed, the values used in calculations will always be the values you actually entered. Individual cells can be assigned their own formats regardless of the column defaults.


Each cell is only one character high but the columns can be any width between 1 and 67 characters. The New Width command can be used to change this at any time. The boundaries are shown on the screen by an upright line of vertical bar characters i.e. |. It would not be sensible to make a cell wider than 67 characters because this is the maximum width of the entry line.


As well as the number and size of lines and columns you are also prompted to specify WHERE you want these inserted. The defined sheet always has a rectangular shape. The line and column labels will be adjusted to reflect the new layout and so will any cell formulae that refer to specified co-ordinates.

Lines and columns can be removed from the sheet by the use of the Zap command. If you use this, the size of the defined sheet will actually reduce. Line and column labels and cell formulae will again adjust to the new layout. Data that is erased in this way is not recoverable. An alternative approach is to use the Blank command which removes the contents of a cell but leaves the cell position itself in a defined state. Again the data is lost.

You are not allowed to Zap cell co-ordinates or blocks that would create a 'hole' in the sheet, nor can you remove data in cells that are used by formulae in another cell. However, you are allowed to use Blank in any of these situations and in the case of the deleted data you will see some question marks to remind you that some data is expected.

Moving around

You can use cursor keys to move around the sheet you have defined. As an alternative use the L,R,U,D keys for left right etc. or the diamond shaped key cluster  + W,A,D,Z.

The current cursor location is the cell drawn in inverse text. To enter any data to the current cell you must use the dot command  to go into Entry mode. This will enter data using the default column format. If you want to use the default text or numeric format start data entry using " or (respectively.

Any data, text or numeric, that will be used by the program in its calculations or other manipulations must, by necessity, be less than 27 characters long, but unless you are loading in a file created from another source the actual limitation will be the width of the entry line on your screen (67 characters). Note that the data is not restricted by the apparent size of the cell on the screen, which can be shortened down to only one character wide. The Natebook spreadsheet will display as much of the information held in that cell as is possible given the limitation of the display and of the display format. The true value of the data is used in all calculations regardless of the way it looks in the display.

As an exception to the above display rules, text can be entered in leading format which means it will all always be visible. If necessary it will spread over several cells to act as comments on the data that is being displayed.

Instead of entering data directly, special built in functions CRD and ET can be used to create and fill cells on the basis of a calculation or formula. This is a useful feature that can be used to produce tables automatically. An example of table filling is given in one of the tutorials.

The third way of creating and filling cells is by use of the COPY function for copying a specified portion of the sheet into a new location. If you choose this option you will be prompted to decide whether or not you want the formulae held in the Cells that have been moved to be changed to reflect their new position.

Types of entry

Cell entries fall into two broad format categories, text and numeric. Each of these can have several sub-categories of display which can be freely interchanged. Text and numeric classifications cannot be interchanged since the data can only belong to one or the other. Text data can, of course, freely contain numbers and formulae, for example as an explanatory comment for the accompanying data. Even so, it is impossible to change the data to a numeric format or calculate with it.

If a numeric format is chosen each cell can be assigned a numerical constant as an entry, for example 3, 9000, 7.88401, or it can be given a formula value which calculates the number that should be displayed on the basis of the contents of the other cells in the sheet or of a calculation of constants.

The maximum number of decimal places you may use is 38. That is, the maximum number you can use in the spreadsheet is 1×10^{38} and the smallest number is 1×10^{-38} . 15 significant figures is the most that can be entered and displayed but internal calculations are done to 16 or 17 significant figures.

As well as entering numbers in normal format, you can use scientific notation for entering particularly big or small numbers. For example, rather than entering 12,345,000,000 you could enter it as 1.2345E+10 or 0.12345E+11. Similarly, 0.0000000765 could be entered as 0.765E-7 (or 7.65E-8 or 76.5E-9 or 0.0765E-6 etc.). You must type the E in upper case for this to work.

You can use a special format to ensure that numbers are always displayed in an exponential format if you wish. Even in a General format cell, if it holds a large number and its width is reduced the display may be changed to exponential format so that the number can still be displayed.

Numeric cells can hold either constant numeric values or they may hold an expression. Simple examples of valid formulae would be

3+B1, 10*(343-A11), B23-C12/D13

Unless you tell it to do otherwise, by switching off the automatic calculation feature, the Notebook spreadsheet will attempt to calculate the result of the formula that you type in as it is entered so that by the time you finish typing, the correct result, given the

current status of the sheet, will already be shown in the appropriate cell. Blank values in cells referred to in a formula will be taken as zero.

Formulae can also include within them complex functions, either built into the program already or those that are defined by you. Examples would include:

B1+SUM(A10...A20)

Which means add the contents of B1 to the sum of all the non-blank cells in the range A10 to A20.



SIN(30)-COS(A23)

Work out the sine of 30 degrees and subtract from it the cosine of whatever value is held in A23.

In these examples SIN, COS and SUM are all built in functions that can be used freely in your calculations. Any cell that is referred to in a formula, such as A23 in the example immediately above, can itself contain a value that is dependent on the solution of a formula entry.

and **!** commands are two useful commands that come into use when entering data. If **#** is typed after a cell co-ordinate when entering an expression then the reference is replaced by the actual value that is held in the cell at that time. If the value that is held in the cell is later changed it does not affect the expression that has been entered.

The **!** command is similar, but it causes the entire expression up to the point where it is typed to be replaced by its current calculated value.

It is possible to switch between the normal spreadsheet display of numbers and text and a display of formulae that go to make up these numbers by use of the  - eXchange command. The  key can be used to temporarily see more lines of the sheet. When the X command is used it is often necessary to widen the display of columns using the NW command.

Circular References

It is usually important to avoid circular references such as setting cell B1 equal to $2 \times A1$ and setting A1 to $3 \times B1$ for example, a situation that is not resolvable unless both cells take a value of zero.

Some circular references are logically correct and in certain special circumstances it is possible and indeed very useful to be able to enter a circular reference of some kind for the iterative solving of simultaneous equations. An example of a circular reference might be to set cell A1 equal to 0.5 then set B1 to $\text{COSR}(A1)$ followed by setting A1 to B1. Then continually press ! to force a recalculation until the values settle down to a nearly constant value. You will have solved the mathematically very difficult equation: $x = \cos(x)$ (in radians).

A full list of built in functions available is given later in the Expression Entry section of the Complete command summary. The expressions and formulae you build up using these functions are the processing heart of the Notebook spreadsheet. It is these that make it such a useful tool. They can handle simple mathematics up to the most complex financial or scientific calculations.

More on formats

Each piece of data entered onto a worksheet will have an associated format that determines how it is displayed on the screen.

There are about a dozen built in formats that can be used, some relating to text and some relating to numerical data. It is possible to switch formats as long as the data within a given cell can conform to the new type. For example you can switch a number between Integer format, which only displays the whole number part of a value, to a Financial format, which displays data correct to two decimal places.

Data can be assigned to an incorrectly formatted cell if it has been loaded in from an existing file onto an existing sheet or by using the edit option. However, any attempt at performing a calculation on the data will throw up the error.

As is the case when changing the display width at a cell, changing a format will change the way that information is displayed on

screen but will not alter in any way the actual value of the information itself. For example if you have entered the value 2.5345 into cell A1 which is displayed in integer format (the value 3 is actually seen) and you put the expression $2 * A1$ in cell B2 which is also in integer format, which displays the value 5, this would appear to give the result that $3 * 2 = 5$. A true integer calculation can be forced by using expression such as `INT()` in the calculation formula.

Certain of the Notebook spreadsheet's built in functions and expressions work on a specified range or column of the data. For example, to AVERAGE some of the data you would specify the range thus:

AVERAGE (B1...B10)

Which means find the average of all non-blank entries between B1 and B10.

Any blank cells that fall within this range are ignored in the above calculation. This saves you from having to create unnecessarily complicated expressions in order to encompass all of the data required. You can also leave a range of cells blank and only fill in the data when the other formulae have been entered.

Careful use of the Format option can help to produce some quite sophisticated displays and printouts. Text can be left or right justified in its Cell. There is also a format choice of Carriage Return that can be assigned to individual Cells or ranges. This is a special format that is only used to control printout in such a way that address labels can be produced.

The COPY command

One of the most important commands available is Copy. Its use extends far beyond that of simply copying data from one part of the sheet to another, it is designed to allow any information to be written from any input device to any part of the sheet, or from any part of the sheet to any output device, or between any two parts of the sheet. It therefore takes the place of both a save and load command and of the printing command. As well as saving, loading or printing entire files it is also possible to perform operations on defined blocks or ranges of the data. 'Blocks' as small as one Cell can be copied to a file in memory or the printer. Once the option

has been selected you will be prompted through all of the available choices.

When copying within the sheet you cannot copy beyond the current sheet boundaries. Any data at the destination will be overwritten unless another part of the sheet refers to it. The copied data takes its own format details with it.

SAVING and LOADING

Unlike other spreadsheet programs which have separate Save and Load commands, the Notebook spreadsheet achieves all these functions with the ubiquitous Copy command. Saving is achieved by specifying "File" as the destination of the copy. Loading is achieved by specifying "File" as the source of the copy.

When you save data to a file you can specify up to an 8 character name. This is then followed by a full stop and either MEM, TXT, DAT or DIF. This "extension" determines the format of data written to the file. If you don't give an extension, MEM is added automatically.

The different file formats are explained in the tutorial and within the command reference section.

If you use the Quit option to leave the Notebook spreadsheet without having previously saved your work then the spreadsheet automatically makes a copy of the sheet called RESTART.MEM. This file should be renamed or resaved as soon as possible so that it is not accidentally overwritten. When you next start the spreadsheet, you can use the Restart command to quickly reload this file and continue where you left off.

Printing

Once again, the Copy command is used to achieve a task that may be done by a separate command. In other spreadsheet programs, Worksheets, or a portion of them, can be printed by using the Copy to Printer command sequence. Sheets are printed as they appear in the display but without dividers or system messages.

Mail labels are a special print option but to use them to their full advantage will involve inclusion of special columns containing Carriage Return default formats. An example of this is included in the tutorial.

Database functions

The worksheet can be searched to find a specific data entry, either text or numeric. The search will operate on the true data value or expression that has been entered in the cell NOT the displayed data. The command used for this is the Get command.

Lines of data can be sorted into order, i.e. physically re-arranged in the sheet such that the information in the specified column ascends or descends. The Sort command is used to do this.

It is best to sort either text or numeric data, unpredictable results occur if they are mixed. If the data is text then upper case letters are treated the same as lower case, numbers rank below letters and are treated in a textual way e.g. 7 ranks higher than 66.

Advanced functions

Conditionals, Loops and Macros

The Notebook spreadsheet includes some features that will be familiar to anyone who has had experience of high level computer languages such as BASIC.

The conditional command sequence IF (*logical test*) THEN *expression 1*) ELSE (*expression 2*) can be used to build decision making into the sheet. If the *logical test* is passed as TRUE the part of the expression after the THEN is calculated. If the test is FALSE then the ELSE part is calculated.

An extension of the IF THEN sequence is the DO (*range of expressions*) WHILE (*logical test*) loop. The expressions in the cells listed following the DO is performed at least once, and then repeated over and over again whilst the logical test is passed as TRUE. As soon as the test becomes FALSE, or an error occurs, then the loop is stopped. The simplest form of logical test is to set up a counter that is increased or decreased with every DO expression, special functions INIT, INC and DEC help you to do this; when the counter reaches a specified value the loop will stop.

A Macro is a term given to a sequence of commands that you are able to access with just one command. The * command is used to call a macro. They are most useful when you find that you are performing a certain sequence of commands over and over again.

Looping Macros can be defined, i.e. ones which continue to repeat until the task is completed or an error occurs.

Note that a Macro is a loop of direct commands rather than of mathematical functions such as occurs with a DO WHILE loop. It can contain commands such as L for cursor left, or NF for new Format, commands that act directly on the sheet and can not be made part of an expression. The Macro commands act exactly as if you have typed them in at the keyboard.

Table creating and reading

Certain functions, (SET, INIT, DEC, INC) exist that will let you set the value of data held in another cell. These can be incorporated into a DO WHILE loop in order to facilitate the automatic creation and tilling of tables.

Other functions exist such as LOOKUP and INTERP which are designed to automate the process of consulting tables in order to extract data.

Date and Time Functions.

The Notebook spreadsheet will let you input date and time functions into the sheet. The spreadsheet gets the correct date and time from the Notebook's own clock so you must ensure it is set correctly if you use these functions. It is possible to build these functions into formula expressions, logical tests, loops and macros such that the program will adjust its output dependent on time.

Graphics options

A range of graph and chart designs can be created through the spreadsheet's Trace graph command. Special functions exist to signal to the spreadsheet which type of graph you want to display and to inform the program of which data ranges are to be plotted together with labels and axis scales etc.

SPREADSHEET GUIDE - PART FOUR

Command Reference Guide

Expression entry

An expression is rather like a mathematical formula that can be entered into a given cell. The formula normally remains invisible but the Notebook spreadsheet will work out the resulting solution and display that in the cell when it is on screen.

An expression is typed in on the edit line (after Next:) and on completion is inserted into the memory together with an order of calculation number. On completion, the memory remaining is also calculated and displayed and if automatic calculation is switched on, the worksheet is recalculated.

As you type the value of the expression will be worked out and displayed in the target cell, but the expression itself will be displayed inside brackets on the cell contents line at the top.

Evaluation of expressions

Expressions may contain functions, co-ordinate references, numbers, arithmetic operators, logical operators and special purpose operators. Expressions are evaluated according to the rules of normal algebra.

As in algebra all operators are given an importance which determines the order in which the various parts of the expression are calculated. This order of importance is over-ridden by parentheses, each set of which is evaluated as if it were a self-contained expression. The innermost set of parentheses is calculated first and then the next innermost and so on working outwards.

In order to multiply two sets of parentheses, an asterisk symbol must be put between them, this is the computing convention for a multiply sign. You cannot have $(2+5)(3+7)$ to multiply the two expressions; instead you must put $(2+5)*(3+7)$.

The operators within the expression or set of parentheses are calculated in the following order:

()	parenthesis
+n, -n	unary plus and minus
n1%n2	percentage
n1^n2	raise n1 to the power of n2
n1*n2, n1/n2	multiplication and division
n1+n2, n1-n2	addition and subtraction
n1>n2, n1<n2, n1=n2	greater than' and 'less than' and 'equal'
n1]n2, n1[n2	'greater than or equal' and 'less than or equal'
not (n1)	not.

If an exclamation mark is encountered on the entry line then the value of the expression to that point is determined and replaces the whole of the expression on the edit line.

If, for example, you have typed an expression such as $2*B1+20$ the resulting value displayed in the cell will change if the entry that is held in B1 ever changes. By inserting an exclamation mark thus $2*B1!+20$ the expression is calculated using the value that is held in B1 at that time. The resulting entry is therefore constant and no longer dependent on B1.

Alternatively, you could use the hash symbol # after the B1 and just the value of B1 would be replaced in the expression. By using $2*B1\#$ you would get 2*1.17 on the edit line if cell B1 contained 1.17.

The ! should be used with caution as indeterminate results may occur if, for example, it is used from within a function.

Building expressions

The valid parts of an expression are as follows: numbers, co-ordinates, operators, conditionals, functions and user defined functions.

Numbers can be either be entered as normal digits or can be entered in exponential, scientific format. You could, for example, either enter 274529000 or 2.74529E8 (or 0.274529E9 or 27.4529E7 etc.). You can enter up to 15 significant digits. Internal calculations are performed to 16 or 17 significant figures. The range of numbers you may use is from $1E-38$ to $1E+38$. That is from

.000,000,000,000,000,000,000,000,000,000,000,01 up to 10,000,000,000,000,000,000,000,000,000,000.

Co-ordinates are references to other cells in the sheet and consist of a letter A..Z or a..z which identifies the column, followed by a 1 to 3 digit line number. It is very important to get the case of the column letter correct. The first 26 columns are capital A..capital Z. The next 26 columns are lower case a..lower case z.

Operators, listed below, are the normal mathematical symbols such as "+", "-", etc. Most are used in the form "expression" operator "expression".

A conditional is like an operator but is used to build an expression that evaluates to an answer of TRUE or FALSE (these are actually represented by the numeric values -1 and 0). Conditionals are normally used with the IF() or WHILE() functions. You might, for example, have IE(A1>7)... which means "if the value in cell A1 is greater than 7 do the THEN() part of the expression.". In this case the ">" is the conditional operator.

Functions comprise a named operation with its required parameters in brackets and where there are more than one, these parameters must be separated by commas. There are three types of function, those whose arguments have multiple parameters, those which have single parameters and those which have no parameters at all.

When an apparent function name is encountered it is checked against the list of built in functions. Functions may call other functions in their parameters. Indeed a function may even call itself amongst the parameters.

You can have a function as a parameter to a function as a parameter to a function... etc. However, there is a limit to the amount of "nesting" you can use. All you need to know is that if the nesting has become too great (i.e. if there are too many levels of brackets in your expression) an error message will come up and it will only be necessary to rearrange the expression so that it is placed into two entries rather than one.

A user-defined function acts just like one of the built in functions but makes use of a formula that you have entered onto the sheet and is called by giving the reference to the cell containing the formula to use with any parameters listed in brackets after it.

Expressions are evaluated as you enter them, not on completion. This means that you have dynamic error checking character by character. If you enter a wrong character you will get an immediate error message. To correct an error, backspace with the \leftarrow key and then enter a new character.

Note that it is impossible for the Notebook spreadsheet to check for errors that are 'legal' in the context of the program but are not the correct expression that you intended to enter. For example, if you enter A1+3 when you really meant to type A3+1 no error can be detected because the spreadsheet thinks A1+3 is a valid expression.

If you are entering a complex expression such as a DO-WHILE formula then the calculation character by character can get bogged down. This is because it will be trying to do the whole DO loop as you enter the instructions. In this case first switch off the automatic calculation. This is done with the Automatic Calculation command.

The valid operators in an expression

Arithmetic Operators

- + Addition
- Subtraction
- * Multiplication
- / Division
- ^ Exponentiation (raising to a power)
- % Percentage

Logical Operators

Logical Operators act on arithmetic values or expressions (A and B below) and produce a result of TRUE (-1) if the condition is met or FALSE (0) if it is not.

= Equal	(A = B)
> Greater than	(A > B)
< Less than	(A < B)
] Greater than or equal	(A] B)
[Less than or equal	(A [B)
Not equal	(A B)
	(the symbol is typed with \leftarrow)

Built in functions

The following pages contain a list of all the functions recognised by the Notebook spreadsheet. They are given in alphabetic order. The following are one or two notes about some of the specific types of function.

Trigonometric functions

COS, COSR, SIN, SINR, TAN, TANR

There is no restriction on the size passed to these functions as 2π or 360 degrees will be repeatedly subtracted until X is within range. X may be negative.

ACOS, ACOSR, ASIN, ASINR

The value passed to these functions must be between -1 and 1

Logical Functions

You can enter the functions FALSE or TRUE where a logical expression is expected. FALSE will result in a conditional test failing while TRUE will make it succeed. The actual display in a cell holding the FALSE or TRUE function will be 0 or -1 respectively.

Logical functions analyse a list of logical values or expressions (given as X, Y, Z below) and return a value of TRUE or FALSE as defined above. In practice each expression or value is tested to see if it is -1 or 0. If it is -1 it is taken as TRUE, if it is 0 it is taken as FALSE.

Date and Time functions

Where a "date" is called for or returned by a function it is an expression of a particular date as a single number made up as follows - *ddmm.yyyy*. The *dd* part is 1 or 2 digits that specify the date (1..31), the *mm* part must always be given or read as two digits giving the number of the month (1..12). For months 1..9 it is 01..09. The *yyyy* part is the year and is always four digits.

Alphabetic list of built in functions

ABS(X)

The absolute value of X is returned. It is defined as the numerical value of X with a positive sign.

ABS(-2.345) = 2.345

ABS(2.345) = 2.345

ACOS(Y)

ASIN(Y)

ATAN(Y)

These functions determine the angles in degrees whose cosine, sine or tangent respectively is given by Y. The result is given in the range -90 degs to 90 degs.

ACOSR(Y)

ASINR(Y)

ATANR(Y)

These functions determine the angles in radians whose cosine, sine or tangent respectively is given by Y. The result is given in the range $-\pi/2$ to $\pi/2$.

AND(X, Y, Z)

X, Y, Z, are in turn checked for truth. If they are all TRUE then the function returns a value of TRUE (-1).

AND (TRUE, TRUE, TRUE) = TRUE

AND (TRUE, FALSE, TRUE) = FALSE

AVERAGE(list)

The average of the non blank values in the list is calculated.

AVERAGE (3, 4, 5) = 4

BLEEP

Sets off a bleep. Use it as an audible signal. Can be useful to indicate that a recalculation is complete. Arrange for it to have the highest order of calculation number by including a reference to the last result calculated in the cell that contains BLEEP.

For example:

B9, BLEEP

CHOOSE(*N, list*)

The nearest integer value to *N* is found and the *N*th item in the *list* is returned.

CHOOSE(3, 5, 6, 7, 8, 9) = 7

COMB(*N, R*)

The number of ways of combining *R* items from a total of *N* is calculated.

COMB(8, 3) = 56

COS(*X*)

COSR(*X*)

Returns the cosine of *X* where *X* is in degrees for COS and in radians for COSR.

COS(45) = 0.707106781186548

COUNT(*list*)

The list is checked for the number of values that are not blank.

COUNT(2, 3, 4, B5) = 3 cell B5 is blank.

CRD(*column, line*)

Can be used in some functions where a co-ordinate is expected. The *column* must, however, be expressed in a numerical form (A=1, Z=26 etc.). This function is useful in filling up tables from DO iterations.

SET(CRD(3, 7), 10) sets cell C7 to the value 10

DATE

Returns the date in the form of a single number, for example

312.1987 - being the 3rd December 1987

DATEAFTER(date, days)

Gives the date that will be the number of days specified after the input date. Be careful to put months 1 to 9 as 01 to 09.

DATEAFTER(1308.1992, 50) = 210.1992

50 days after 13th August 1992 is 2nd October 1992

DAY

Gets the current day of the month from the Notebook's internal clock. The result will be a number between 1 and 31.

DAYOFWK(date)

Returns the day of week as a number. Saturday has a value 0, Sunday 1, Monday 2 etc.

DAYOFWK(1308.1992) = 5 = Thursday

DAYOFWK(904.1963) = 3 if date is 904.1963
= Tuesday 9th April 1963

DAYOFYR(date)

Returns the number of days between January 1st and the given date. In this case, the date does not need to include a year but remember that leap years include an extra day.

DAYOFYR(904) = 99 9th of April is 99th day of the year

DAYSAPART(date1, date2)

Gives the number of days between any two specified dates.

DAYSAPART(904.1993, 2512.1993) = 260

DEC(X)

Returns the value of X minus 1. This is also intended for DO-WHILE iterations, primarily to act as a counter. This is a command function that will change the value held in the cell specified.

INIT(B1,10), DO(A1...A4), DEC(B1), WHILE(B1>0)

DELAY(*n*)

Does nothing until *n* seconds have elapsed. It may be a cell reference or a value. For practical reasons make it a cell reference with a value 0 until you actually want to run your application.

DO(*range*)

Allows subroutines, looping and iteration on the specified *range*. If iteration or looping is required the line will need to be terminated with a WHILE function.

DPART(*X*)

Takes the value of the decimal part of *X*, that is the part after the decimal point. Be warned that this function loses one significant figure for each figure that was previously before the decimal point. If you get unexpected results consider this.

DPART (5.78) = 0.78
DPART (-3.45) = -0.45

e

Gives the exponential constant *e* - the base of natural logarithms.

e=2.7182818284905

ERROR

A special function that if encountered in a calculation will bring up a message that an error has been called from that cell. Usually used in a check that values entered are in a permissible range.

IF (A1=0), THEN(ERROR), ELSE(3/A1)
prevents an attempt to divide by 0

EXP(*X*)

Raises the constant *e* to the power in the bracket following. A check is made to ensure that the exponent is not too great. This gives the natural anti-logarithm. Natural logarithms are calculated using LN().

EXP (3.14159265358979) = 23.1406926327793

FACT(X)

Works out the factorial of X. If X is not an integer it is rounded up or down to the next nearest integer before the factorial is calculated.

FACT(5.2) = 5*4*3*2*1 = 120

FALSE

Takes a value of FALSE (0). This may be used in logical expressions.

GROW(value, percentage)

Will increase a value by a percentage. The percentage can be negative.

GROW (300, 5) = 315

HOUR

Uses the Notebook's Internal clock to give the current hour as a number between 0 and 23.

IF(logic expr), THEN(expr 1), ELSE(expr 2)

This group is used to build decision making into the worksheet. The *logical expression* is analysed and if TRUE, THEN expression 1 is used to get the value for the cell. If the *logical expression* is FALSE then the ELSE expression 2 is used instead. The expressions themselves can be further IF... sequences building up extremely complex decision making sequences.

IN(port)

Reads an 8 bit port given by the number or cell reference 'port'. Only included for compatibility with other versions of the Cracker spreadsheet. Its use on the Notebook should be avoided at all cost.

INC(X)

Returns the value of X plus 1. It is general purpose but is mainly included for convenience in creating loops. It is a command function that will update the value held in the cell specified.

INC(2.345) = 3.345

INC(A3) will add one to whatever is held in A3 and then write it back.

INIT(crd, val)

Will initialise a cell within a specified value. The cell containing this function will have a low recalculation number. The function is used for setting up loops and iterations. It is very similar to the SET function except that it is guaranteed a low recalculation number.

INIT(B7, 10) will set cell B7 to contain the value 10.

INT(X)

Takes the value of the integer part of X , that is the part before the decimal point, with the sign retained.

NOTE: this definition may not be the same as that to which you are used if you are familiar with some computer languages such as BASIC. The function NINT() behaves more like you might expect.

INT(5.78) = 5

INT(-3.45) = -3

INTERP(N, range)

Compares N with each value in the *range* to find the two values between which N lies. The two values from the adjacent line or column (to the right or below) are then interpolated to give the final value. The interpolation is done by taking the proportionate distance that N lies between the first two values and applying it to the adjacent values.

LN(X)

Determines the natural logarithm to the base e of the value in brackets. The routine will check for negative or zero arguments which are not allowable.

LN(10) = 2.30258509299405 and EXP(2.302585...) = 10

LOG10(X)

Determines the logarithm to the base 10 of the value in brackets.

LOG10(1234) = 3.09131515969722 (and $10^{3.09131...} = 1234$)

LOOKUP(*N*, *range*)

N is compared with each value in the *range* to find the first one it is greater than. The value from the adjacent line or column (below or to the right) is then returned.

MAINTITLE(*cra*)

A graphics function explained in the description of the Trace command and Tutorial XV.

MAX(*list*)

The *list* is scanned and the maximum non blank value returned.

MAX(2, 7, 3) = 7

MIN(*list*)

The minimum non blank value in the *list* is returned.

MIN(2, 7, 3) = 2

MINUTE

Reads the Notebook's clock and returns the current minute as a number between 0 and 59.

MONTH

Reads the Notebook's clock and returns the current month as a number between 1 and 12.

NINT(*X*)

The nearest integer value to *X* is found.

NINT(2.23) = 2

NINT(5.67) = 6

NINT(-3.45) = -3

NOT(*X*)

The truth of *X* is checked and the opposite is returned as the function value. If the value of *X* is TRUE then FALSE (0) is returned. If the value is FALSE then TRUE(-1) is returned.

NOT(TRUE) = FALSE

NOT(3>5) = TRUE

NPV(% , list)

Calculates the present value of the cash flow list using the discount % as specified. See tutorial for example.

OR(X, Y, Z)

X, Y, Z. ore in turn checked for truth. If any of them are TRUE then the function returns a value of TRUE (-1)

OR(TRUE, FALSE, FALSE) = TRUE one item is TRUE

OR(FALSE, 35, 7) = FALSE as none is TRUE

OUT(port, value)

Outputs a *value* given by a number or cell reference to the *port* given by a number or cell reference. This should not be confused with the OUT command which sends characters specifically to the printer.

NOTE: This function is only included for compatibility with other versions of the Cracker spreadsheet. Its use on the Notebook is to be avoided of all costs as it will almost certainly crash the computer and the only recourse will be to switch on holding down the **[Function]** and **[Stop]** keys. All data in the Notebook will then be lost.

PERM(N, R)

Finds the number of ways of permuting *R* items from a total of *N*.

PERM(5, 3) = 60

PI

Returns the value of the constant PI - the ratio of a circle's circumference to its diameter.

PI = 3.14159265358979

POS(X)

Gives the value of the argument if it is positive. If it is negative then * returns a value of 0.

POS(2.345) = 2.345

POS(-2.345) = 0

RND

An integer random number between 0 and 127 is found. This number is taken from the Z80 refresh counter. A new value is returned each time the function is recalculated.

RND = 23

RND = 120

RND = 3

ROUND(X)

Takes the value of *X* rounded to two decimal places. It is of use in financial calculations to avoid cumulative errors caused by including fractions of a penny (cent etc.). The rounded value is not just displayed; it is also the value stored in the internal memory.

ROUND(1357.5679) = 1357.57

SECOND

The Notebook's clock is read and the current second is returned as a number between 0 and 59.

SET(crd, value)

Will set a cell to a particular *value*. The cell must initially be either blank or a constant. A formula will not be over-written. This command function is usually used with the **DO** function to fill up a table with values.

SIMPRULE(step, range)

Works out the numerical integration of the range by Simpson's rule. The first parameter is the *step* length. *Range* holds the values for integration. The range must be an odd number of values consecutively. The latter parts of the range can be blank and these will be ignored. This makes flexibility in setting up worksheets possible. An example is included in the tutorial.

SIN(X)

Determine the sine of angle *X*, where *X* is in degrees.

SIN(45) = 0.707106781186548

SINR(X)

Calculate the sine of angle X, where X is in radians.

SINR(PI/4) = 0.707106781186548

SQRT(X)

Determines the square root of X.

SQRT(2) = 1.4142135623731

STDEV(list)

Looks through the *list* and works out the standard deviation.

SUBTITLE(crd)

A graphics function explained in the description of the Troce command and in Tutorial XV.

SUM(list)

Will add up the non blank values in a list and will return the total.

SUM(2, 3, 4) = 9

SUM(-3, 4, 5, A4) = 4 if cell A4 contain -2

SUMIF(crd1, crd2..crd3)

This is a conditional adding up function. Only those items in the range *crd2...crd3* will be included that correspond to a cell entry in the column specified by *crd1* and are on the same line.

	A	B
1		123.45
2	MARKER	23.45
3		245.56
4	MARKER	45.67

SUMIF(A1, B1...B4) gives 69.12

SUM(B1...B4) gives 438.13

NOTE: *crd1* can point to any cell in the column but must not point to a cell with a text entry in it or you will get an error message.

TAN(X)

Determine the tangent of angle X , where X is in degrees. $X=90$ or -90 will give an error as the result is infinite.

TANR(X)

Calculate the tangent of angle X , where X is in radians. $X=\pi/2$ or $X=-\pi/2$ will give an error as the result is infinite.

TIME

Reads the Notebook's clock and returns the time in the form of a single number, for example 1503.23 being 3 minutes and 23 seconds past 3 in the afternoon.

TIMELABEL(*crd...crd*)

A graphics function explained in the description of the Trace command and Tutorial XV.

TIME LAPSE

Returns the elapsed time since the ZEROTIME function was last operative. This is in seconds.

TRUE

Returns a value of TRUE, that is -1. May be used in logical expressions.

TYPEPLOT(*crd*)

A graphics function explained in the description of the Trace command and Tutorial XV.

VAL(*column, line*)

Gives the numerical value of the cell specified by the two parameters. The co-ordinates are defined in the same way as for the CRD function.

VAL(8, 3) = 7 if cell H3 contains 7

VAR(list)

Looks through the list and works out the variance. The variance is the standard deviation squared.

WHILE(expr)

Must be used together with a DO function. The expression must be logical and if TRUE the line will be recalculated from the start of the DO on that line. If FALSE the WHILE will do nothing.

XLABEL(crd...crd), or XLABEL(crd, crd, crd, etc.)**XMAXIMUM(crd)****XMINIMUM(crd)****XTITLE(crd)****XVALUE(n, crd...crd)**

These are graphics functions explained in the description of the Trace command and Tutorial XV.

YEAR

Reads the Notebook's clock and gives the current year as a four digit number.

YMAXIMUM(crd)**YMINIMUM(crd)****YTITLE(crd)****YVALUE(n, crdcrd)**

These are graphics functions explained in the description of the Trace command and Tutorial XV.

ZEROTIME

Resets the elapsed time counter. Probably best included in an IF, THEN, ELSE entry and used with TIMELAPSE.

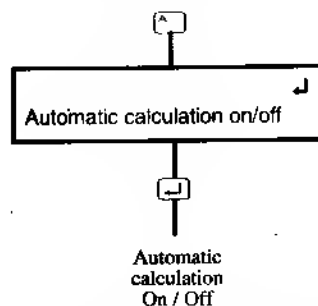
Text entry

If you use the `. command` and the column was created with a default format set at Text, or use the `[F]-Format` command and choose a Text format, or use the Global Format form of entry with the `"` command, then you will be set up for entering text. A marker will be put on the edit line to show the current column width, but you are free to over-write this with a longer entry. The marker just shows how much of the entry will display in the cell with its current width setting.





The prompt **Enter characters** will come up. Any number or character may be inserted and if a mistake is made the `[←]` key may be used to go back and correct errors. If the entry has been completed and you want to move to an adjacent cell and insert information there, then you can use the arrow keys instead of the `[←]` key. This does, of course, mean that you cannot move back and forth along the line you are entering using the arrow keys. If you notice an error towards the start of the line finish entry and then use the Edit command to make the necessary amendments.

Complete command reference

- Automatic calculation command



Automatic calculation, or perhaps it should be called automatic recalculation, is the feature by which as you enter any new data or formulae, or replace existing data by something new, the Notebook spreadsheet automatically updates the displayed worksheet in order to fully reflect these changes.

When you first start automatic calculation is switched on. You can turn off the automatic calculation by typing an  followed by . Similarly, a second entry of  followed by  will turn it on again.

As you get more experienced with the program you will probably find it useful to switch off the calculation process while entering long or complex formulae or perhaps large tables of data. The few seconds taken up each time to calculate and display the results can slow down the overall entry process.

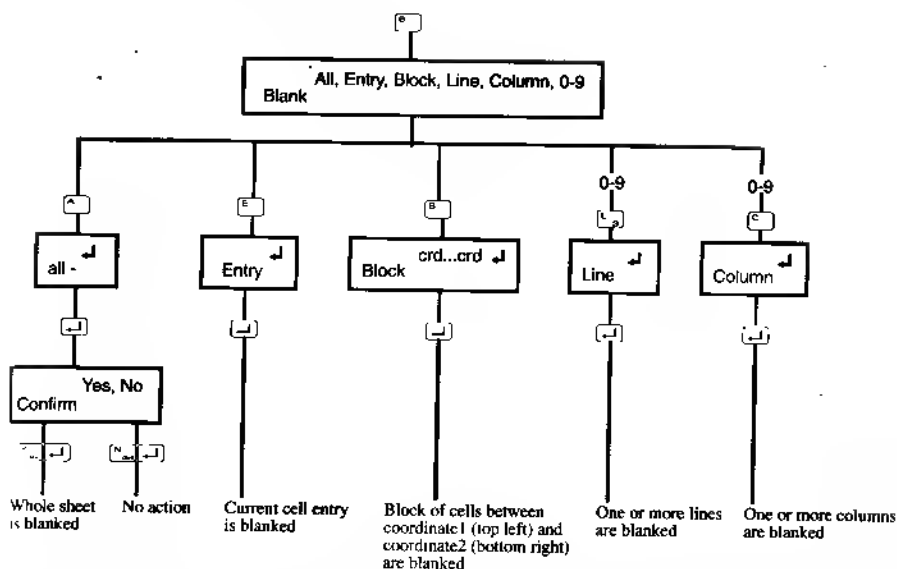
When you switch on the automatic calculation again a full recalculation will immediately be carried out. If you wish to leave the automatic calculation off permanently then you can use the ! - Force recalculation command to force a recalculation at any time you would like it.

Automatic calculation proceeds as you type when you are entering new data or formulae. This is an important part of the Notebook spreadsheet's error catching features. As soon as a calculation or command has been entered that the spreadsheet cannot deal with the calculation will stop and you will know exactly where the mistake lies.

The only exception to the above rule is when you are using the Edit command to make small changes to existing entries. In this case calculation is suppressed until the editing session is completed or you would find that as soon as you delete a certain part of a formula it is probable that an error would be found. The Notebook spreadsheet therefore automatically turns off the calculation until the editing is finished, at which time a full update of the sheet is made.

New users of the sheet may find it preferable to avoid using the EDIT function and simply delete and re-enter any formulae that you wish to change. You are then assured of the benefits of error checking and the command line prompts.

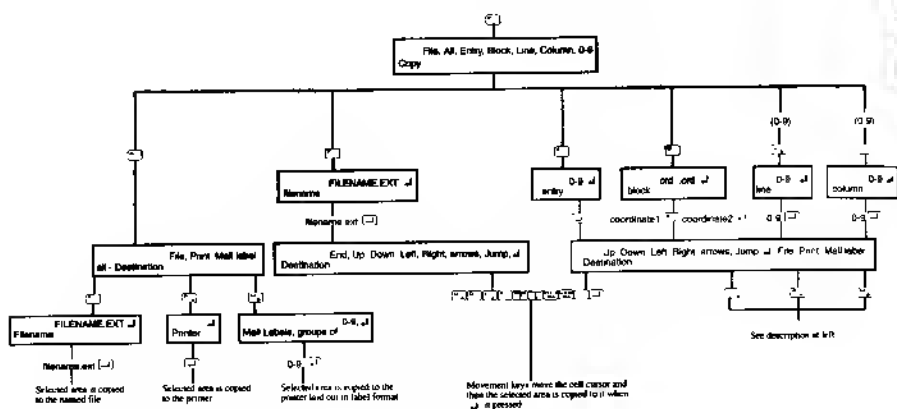
B - Blank command



Blank removes the specified entries from memory but does not affect the structure of the worksheet. Blanked entries cannot be retrieved so if in doubt you should first copy the unaltered worksheet to a .MEM file before starting on complex rearrangements.

Before the blanking is carried out the program will check whether any of the items to be blanked are referred to elsewhere in the worksheet. If cross-references are found the command will stop and warn you. You may then choose to blank the cell even though there is a reference to it. The formula that refers to the cell that is blanked will then assume that the cell now contains zero and line of question marks will appear in the blanked cell to show that another cell relies on its value.

- Copy command



The COPY command is used to transfer copies of sections of the worksheet or entire files to other locations, other files or the printer. There are restrictions with just what can be transferred to where but even so this is a most useful command.

Copying within the worksheet

You have three options. Firstly you can make a single copy of an entry, line, or column to somewhere else in the sheet. Secondly you can copy several lines or columns in a single command to a new area. Thirdly you can copy one entry, line or column several times.

When you type **[C]** to start the copy command you can then type a number followed by **[E]** or **[L]** or **[C]** to say how many lines or columns you would like to copy.

If you are just copying a single line, column or entry, you may then type a number to say how many copies of it you would like.

Generally when making a copy you will be asked if you want to adjust the references. This means that if you are copying a line, all references to other locations on that line will be changed to the destination line. This preserves the sense of the calculations at the

a line. The same applies to adjusting references down a column and, by extension, in a block.



If the formulae do not appear to be adjusted as you would wish you may be trying to copy something so that the copied items are all at an offset to some other item. In this instance follow the offset cell reference in the formula with a quote, '. This is often known as a "lagged" variable or a "relative reference". For example, a formula may be:

A1'+1

Copying to a printer

Copy also performs the role of a Print command and can be used to produce hard copy of specified data from the sheet, ranging from a single entry, lines, columns, blocks and the entire sheet. The printout of course reproduces the data as shown in the current display format and using current column widths etc.

Copying formulae to the printer

It is often useful to be able to print out a copy of the rules or formulae that underlie the worksheet display. To do this you must make the formula 'visible' by using the  -eXchange command. Next adjust the column widths, using , so that they can be seen fully and finally copy the area in which you are interested to the printer.

Areas larger than the displayed screen can, of course, be printed.

When printing out large worksheets you may often wish to fit as much information as possible on each sheet of paper. It is possible to switch to condensed print, if your printer is capable of it, by using the OUT command to send the appropriate codes. This is discussed in Tutorial X.

Preparing mail labels

This command will prepare printed mail labels. The addresses will usually be on a single line in the worksheet so you will have to insert markers where you require each new line to begin. This is done by inserting an extra column at the end of each address line which is given a format of Carriage Return. Remember to put in a carriage return column at the end of the address. You will get confused

results if you leave it out. You will need to adjust the column widths to correctly align the addresses onto the tops of the labels. A more detailed explanation is given in the tutorial guide.

Copying from files into the sheet

If you are already working on a sheet and then select the Copy File command to load in an existing sheet it may be put into any specified blank area of the worksheet or be placed as an addition at the end of the sheet. This command allows very flexible file merging.

The file to be read may either be in the format of a .MEM file or be a .DAT, .DIF or .TXT file. The program will check that the area to which the file is to be copied is vacant and is large enough to hold the data and if not you will just see the message **Not enough space**. Each file will be first read to determine its structure and then read for a second time to extract the data itself.

Each filename extension signifies to the Notebook spreadsheet that it should expect a certain type of information that is held in a certain form. The rules are as follows:

DIF format files are often used by graph plotting programs and many other spreadsheet programs can read and write data in the DIF format. However, only numerical values are saved/loaded in this way. The formulae used to create the results are not saved in this format of file. If you are trying to read DIF format files from another program you may need to rename the file to have the .DIF extension because the Notebook spreadsheet will not otherwise recognise it even though it has the correct format. Numbers will come in formatted to be General and text to be Text Left Justified.

To bring in data from a word processor or screen editor a file must have a **TXT** extension. The Notebook spreadsheet can read both normal ASCII text files and most Document files created by word processors. These are converted to normal text files as they are read in. (Document files differ from standard text in that they contain certain, normally invisible, control codes that are used by the word processor to include bold/italic etc. and to ensure that the right hand edge lines up etc.)

The data text should be laid out in tabular form. It is possible to bring in the numbers as values that the spreadsheet can use in

calculations. The requirements are that you set up the column widths so that each column in the worksheet coincides with one column on the incoming file. The way to visualise the operation is to picture the text coming in as being laid directly on the top of the worksheet as it currently is. Wherever it lands the spreadsheet will try to interpret it sensibly. Remember that the column divider will count as a space.

You must also set the default formats for the columns to be suitable for the incoming file. Be careful that stray items of text in a number column cannot be sensibly calculated and so will stop the operation (without harm). To get round this problem try starting with all the default formats set to Text Left and check that everything looks suitable. If necessary delete items that would cause a problem. Then copy the loaded file back out to another .TXT file. (Of course if there are no problem cells then there is no need to create a second .TXT file, you can just reload the first one). Blank All and set the default formats to the final form using the **[N..P]** command and finally read in the second .TXT file. It's easier than it will seem on reading this.

Files with the extension of **DAT** are expected to contain just numbers. The files can be created with a word processor or other editor (including document files) or as the result of formatted output from a program written in BASIC or FORTRAN.

Files with the extension of **MEM** are intended purely for use from within the Notebook spreadsheet itself. They contain all the information for the program to be able to exactly reproduce the layout and display of the saved file. This is the normal type of file you use to save and load sheets on a day to day basis. You don't have to put the ".MEM" on the end of a name. It is added for you automatically if you don't use one of the other three extensions.

Copying to files

You can use the Copy command to copy the contents of the spreadsheet display to a file in memory. You can choose to save it as a .MEM file if it is to be reloaded into the spreadsheet. Alternatively, you can save to TXT, DAT or DIF files for use in other programs on different computers.

There are two types of Text file that can be read by other programs. The first with the extension .DAT will only copy numbers as they

appear on the screen to the file. The second with the extension .TXT will copy both numbers and also any text, titles and headings, as laid out on the screen. Both will copy any part of the worksheet. If you arrange your .DAT file correctly before saving you should be able to read it from a BASIC program if you want to do further processing.

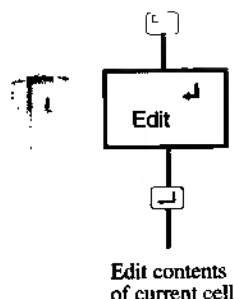
Status lines and column dividers are not saved in such files.

To copy to a file for reading by other spreadsheets or graphics packages just give your file the extension .DIF for Data Interchange Format. Do your copying in the normal way and the program will make whatever adjustments necessary.

Cross reference checking

A section of the sheet cannot be deleted or blanked if there are other parts of the sheet which depend upon values that are about to be deleted. Similarly, if a section of memory is to be written to a .MEM file, it must not make references outside its own area. That section must be able to stand on its own so that tiled sections to be merged in do not interfere with the running of the worksheet. In this way the dynamic error checking is maintained at all times. If you have trouble in erasing by line or column, go back to the Blank Entry command sequence and remove the entries one by one in the reverse order of their calculation numbers.

E - Edit command



Entering the edit mode

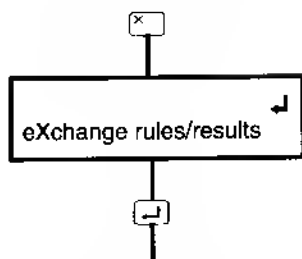
You can edit the contents of any occupied cell. While editing, the automatic calculation feature will be switched off, so you may make errors in what you are typing without being warned. However, on completion of the editing a full recalculation will be carried out. You will then be warned of any errors, which is in direct contrast to what happens when you insert an expression for the first time. You may find it easier to overwrite expression entries rather than edit them, although no real harm can be done either way.

If an error is found when the recalculation is attempted the part that is in error will be displayed. At this point you may press **Ctrl+Enter** to re-edit the line. You can correct the line at this stage by using the **Ctrl+Backspace** key to remove characters. Then make insertions that are necessary and finish off with a **Enter**.




The Edit command is entered by typing **E** followed by **Enter** after which the contents of the current cursor cell will be displayed on the edit line and the cue will be located at the start of the line.



You can use the **Word** and **Line** keys to move along the line. The two delete keys can be used to delete characters to the left of, or under the cue. Pressing **Enter** will exit from the Edit mode and the amended line will be placed into the relevant worksheet cell. If **Stop** is pressed while editing, any changes are lost and the original cell contents are left unchanged.

- Exchange command



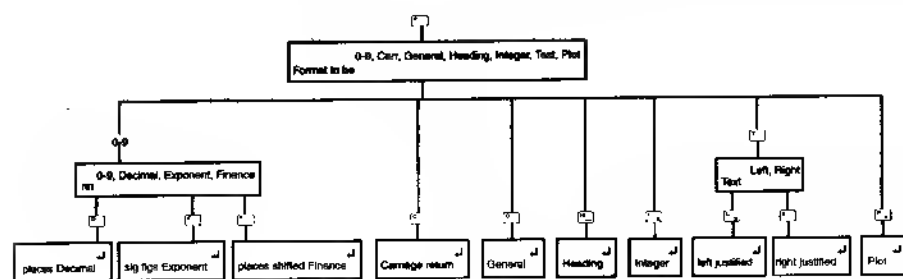
The display is switched between showing the results of the calculations and the formulae that lead to those results

The eXchange command is entered by typing an  followed by a . The effect of this command is to change the display in the cells from the numerical results to the rules or formulae from which they are calculated. It will usually be necessary to change the column width with the New Width command sequence. Go back to display of the answers by typing  once more.

Together with the formulae each expression cell is displayed with its order of calculation number in angle brackets followed by its formula. If  is pressed after the display has changed, the free memory figure will also change to show the amount of index table space that remains. When  is used to switch back to the normal display, the free memory figure will, once again, show how much space remains for cell data.

F - Format command

1. Press the **F** key to open the Format menu.



You use the **F** - Farmat cammand when you want to start typing data into a cell but first want to specify a special farmat for the cell rather than accept any af the default formats. Before you are asked to enter the data you will be asked what format you would like to give the data in this cell.

When entering data there are three types af format that could be appled. The first is the default column farmat (the one you gave when the column was first inserted). If you started the sheet using the **M**-Make sheet option then all columns have a default column format of type General. If you start entering data by pressing **C** then the data you enter will be given this default column format.

The second format that may be used is the Global format. Any data you enter will be given this format if the entry is started by using either the **(** or the **"** command (**'** may be used in place af **"**).

Actually there are two global formats, one for text and one for expressions and numeric values. On start-up the text one is set to Text Left Justified and the value/expression one is set to General. You can change these formats to a variefy af aptians using the New Global command.

The third format that a piece of data may have is that given by using the **F** - Format command.

The various formats that may be applied ta a piece af data have no effect on the way an entry is stored in memary, only on the way it is displayed.

Once specified the format will stay with an entry even if moved or copied to a new position. This is because it is a piece of data that has a format and not a cell location.

Internally, the numbers are stored in a binary floating point format. It is not important to understand the details of the internal floating point number merely to know that it will ensure accurate calculations with up to 15 significant figures. Generally you would not want to display all the available accuracy so the program allows you to define just how many decimal places you want to show.

If you do not really know how many decimal places you can ask the spreadsheet for the vague format definition called General Format. It will display the number in a similar fashion to that of scientific pocket calculators. Thus if the number fits into the space available in its entirety then it will be shown in full. If it is too large or too small then it is converted into the Exponent form (see below). This format will make sure that whatever the result of a calculation the result will be displayable.

The maximum number of decimal places is 38. 15 significant figures is the most that can be entered or displayed but internal calculations are done to 16 or 17 significant figures.

Format types

The format options you have available when entering a value or expression into a cell can each be set to any one of a selection of Format Types detailed below. When specifying a cell format you can choose any of these options, the Global or Default Column formats can be assigned types using the New Global format command sequence.

Carriage

CARRIAGE RETURN, this can only be used as the Default column format when you choose to insert a new column or change its format with the ND command. It should only be used with a blank column, usually of width 1 character. Its purpose is to put in intermediate end of line markers in mailing list and database applications. It has no other use. It is not possible to enter data into cells that have default Carriage return format.

#Dec

DECIMAL, the # defines the number of decimal places that will be displayed.

```
=====A=====
format 5D, memory 123.456789, display 123.45679
format 2D, memory 123.456789, display 123.46
```

#Exp

EXPONENT, the # defines the number of significant figures to be displayed in the decimal part. The exponent form is sometimes called scientific notation. It consists of a decimal number followed by the power of 10 by which it must be multiplied to give the actual number. This power is called the Exponent. A letter "E" separates the number from the exponent.

```
=====A=====
format 5E, memory 123.4567, display 0.12346E+03
format 3E, memory 0.001234, display 0.123E-02
```

#Fin

FINANCE, this outputs all values in balance sheet format layout. The # represents the number of places shifted you want the results. This is the same as saying the number of times you want the number dividing by 10 before displaying it. With this facility you can display your answer in thousands (3F) or millions (6F). Commas are added every third place in the usual way of presenting financial output. Negative values are enclosed in brackets.

```
=====A=====
format 0F, memory 12345.678, display 12,345.68
format 0F, memory -12345.678, display (12,345.68)
format 3F, memory 12345.678, display 12.3
```


Gen

GENERAL, this is a general purpose format that will display the value as simply as possible and as nearly in the way that it might be displayed on pencil and paper calculations. Unnecessary zeroes will be removed and if the number is too large or small it will convert to exponent format. The format bears some resemblance to that used on scientific calculators.

```
=====A=====
format G, memory 123.0, display 123
format G, memory 0.123, display 0.123
format G, 0.000000123456, display 0.123456E-06
```

Int

INTEGER, the value is displayed to the nearest whole number.

```
=====A=====
format I, memory 567.89, display 568
```

TxtL

TEXT LEFT JUSTIFIED, is for alphanumeric entries. The memory contents will be displayed left justified in the cell.

```
=====A=====
format TL, memory 'TEST', display TEST
```

TxtR

TEXT RIGHT JUSTIFIED, is for alphanumeric entries. The memory contents will be displayed right justified in the cell. If the cell is smaller than the entry the display will be filled as if it was going to be left justified.

```
=====A=====
format TR, memory 'TEST', display TEST
format TR, memory 'THIS IS A TEST', display THIS IS A T
```

Head

HEADING, is for alphanumeric (text) entries. The memory contents will be displayed in their entirety even if the column is not as wide as the entry. This format can therefore be used for titles when the column width is, at different times, liable to be varied. Adjacent entries will not be displayed if the heading over-rides them.

```
format H, memory 'THIS IS A TITLE',    ===A=== ===B===  
display THIS IS A TITLE
```

Plot

PLOT, will fill up a cell with asterisks to the nearest integer value of the stored number. This is used to provide a very simple histogram representation of data.

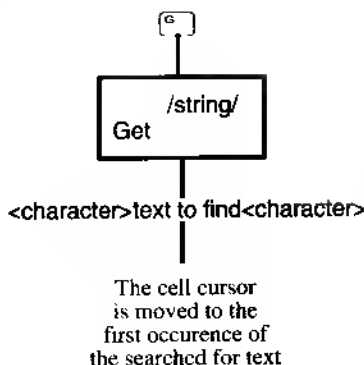
```
format P, memory 5.556, display    ===A===  
*****
```

Overflow:

If there is insufficient space to display a numerical value then the cell will be filled with asterisks to avoid misleading you with incomplete figures. The same does not occur with text entries (c.f. also headings).

```
format 4D, memory 1234.56789, displsy  ===A===  
*****
```

G - Get command

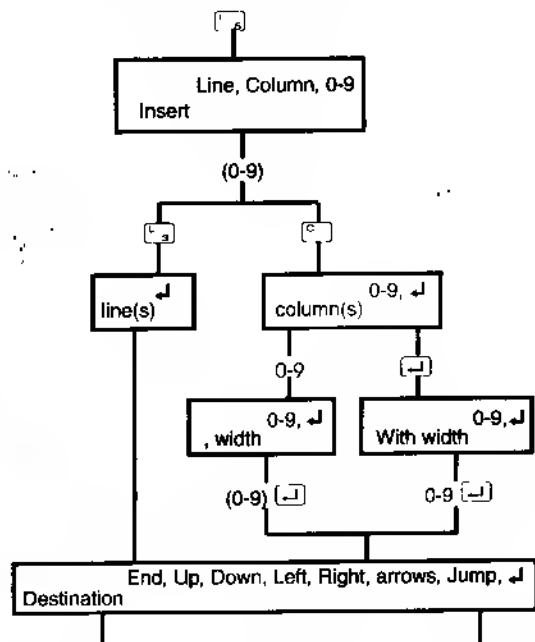


The Get command is used to search from the current cell location to the end of the worksheet for a particular string. The string is delineated on the edit line by a single printable character which must not be a letter or numeral. When this delineator or marker is next encountered on the line the string you are typing is assumed to be complete. This system is adopted to give you flexibility over which characters actually are included in the string.

The string length may be up to 30 characters not including the delineators. Only the text or expression as it appears on the contents line is searched. You cannot search for displayed values that appear as the result of manipulation by the current formats. The search proceeds across each column and then down a line and so on.

If repeated searching is to be used then after initially setting up the string it is merely necessary to follow the G command with the same two delineators as used before. The string that was previously used will be re-displayed and form the basis of the following search.

5 - Insert command 4 exit



For column insertion you are now asked for the default column format - see the [F] command for more details

These options allow the destination to be selected - when [↵] is pressed the new line(s) are inserted at the current cursor position or the bottom of the sheet if End was selected.

The Insert command is used to increase the size of the worksheet. The sheet does not initially exist but you can either press [M] to make a blank sheet of fixed size and type. Or, if you choose to use the Insert command to create your sheet you must start by defining at least one column. Once a column is inserted you can insert lines. You can insert several columns or lines at a time.

You are asked for a destination so the spreadsheet knows where in the sheet you wish the new lines or columns to go. The first lines can only be inserted in front of the cursor (press [↵]) or after the cursor (press [E] for End). As the defined sheet builds in size the available options increase.

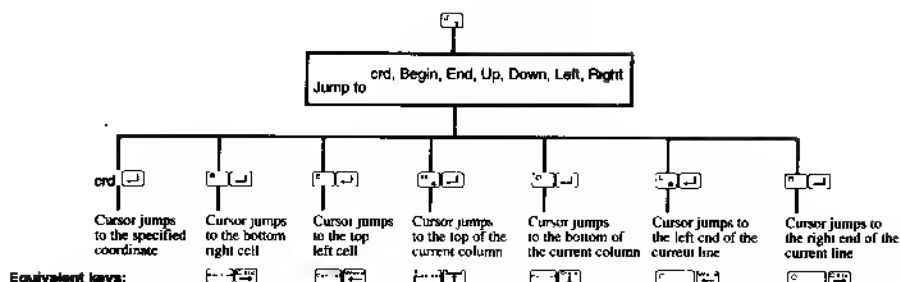
The options "Up, Down, Left, Right" and "arrows" in the destination prompt just mean that you can press [↑], [↓], [←], or [→] or use the cursor keys to move the cursor. When you press [↵] the line/column will be inserted above or to the left of the cursor. You can also use a jump destination to move the cursor to the position where you

would like the insertion to take place. See the Jump command description for more details.

If you are inserting one or more columns you will then be asked to specify a default format for the columns. See the description of the Format command for more details.

Increasing the size of the sheet does not use up any of your available memory, this only happens when data is entered.

J₁ - Jump command



The Jump command is used to move the cursor directly to the cell you specify or edge of the worksheet. The ord prompt refers to the co-ordinate cell reference to which you want to go. The other prompts refer to the extremities of the worksheet. So **J**₁**B** - Jump Right means take the cursor across all the columns to the right hand side of the worksheet. This command can be used both as a primary command and in answer to the request for destination.

J₁**B** will go to the top left of a sheet.

J₁**E** will go to the bottom right of a sheet.

J₁**U** will go to the top of the current column.

J₁**D** will go to the bottom of the current column.

J₁**L** will go to the start of the current line.

J₁**R** will go to the end of the current line.

Loading a file

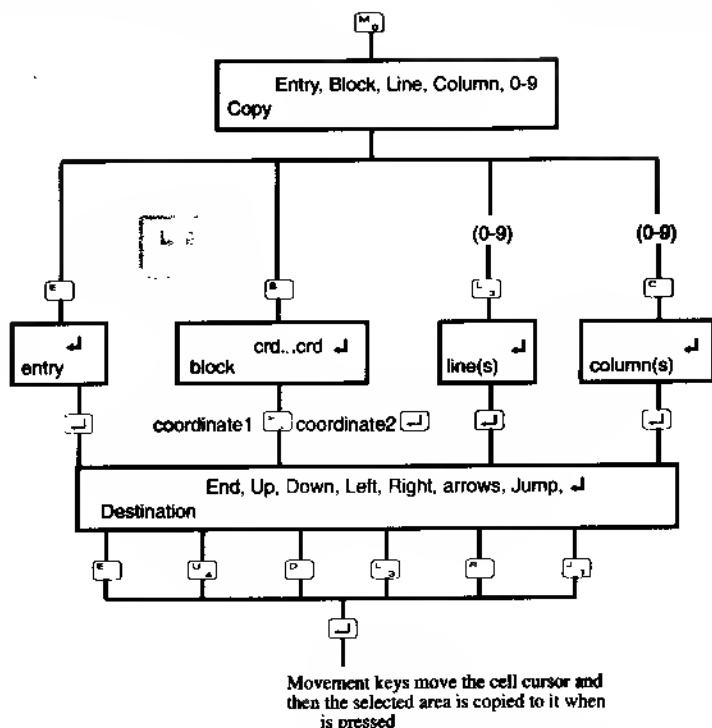
br.

The Notebook spreadsheet does not have a separate Load command. This is achieved using the Copy File command. See the description of the Copy command for more details.

File Edit View Window Help
Copy File

M - Move command

well -



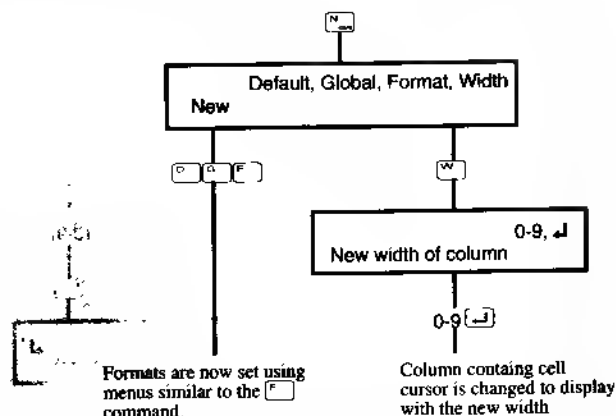
The Move command transfers a section of memory to a new destination. Unlike Copy, the original cell locations are blanked and all references to the transferred area, and within the block itself, will be automatically adjusted to the new location.

The same options are available as with the Copy command.

If several lines or columns are being moved an Internal check is made that the destination specified will provide sufficient room.

N - New command

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The New command defines a change of either width of a column, format of an occupied cell, default column format or Global format. A new format can only be a change between compatible types for example a change cannot be made between a Text and a Finance format. This is because one is character information and the other is numerical information. A change in default column format will only affect future entries that do not have their format explicitly defined. No change will be made to existing entries. Please also study the FORMAT command reference.


New Default format will change the default format for blank cells in the current column. (It over-rides the format that was set when the column was first inserted).

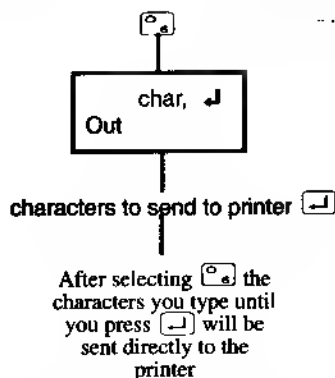
New Global changes the global format accessed when you start entry with " or {. If you set a text format this changes the global text format and if you set a numeric format this changes the global numeric format.

New Format is used to change the format of a piece of existing data. This cannot be used on a blank cell.







New Width will change the displayed width of a column.






- Out command










Amos 9.0 - 



The OUT command is the way you output control commands to your printer. You can set up your printer for special features such as condensed print or different character font or a different colour if you have it available. The affects you can achieve on your printer are completely dependent on the features that it supports. The spreadsheet just send the codes that you type to the printer. It does not try to understand the effect they might have.

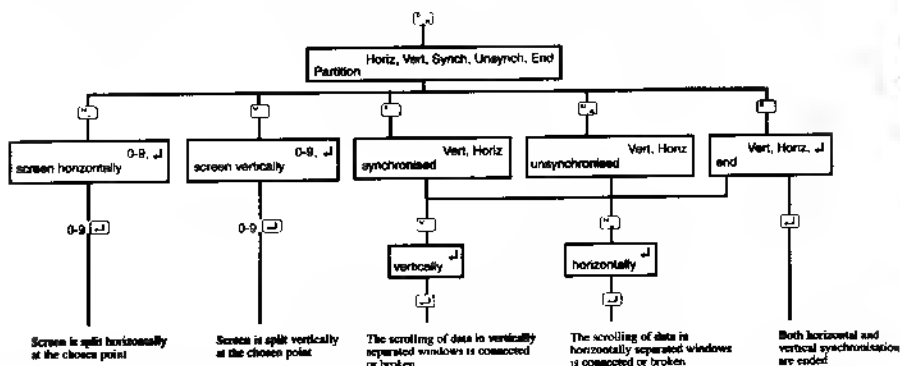
All characters including control codes are valid and so you cannot use the  key to backspace. If you make a mistake finish off that entry with a , and start it again. You can abandon an Out command by pressing . To produce the "Esc" character that many printers use to access their specific features press +. Finish off each entry with a . Your characters will be echoed on the screen, control codes will be preceded by a ^, You will find the printer commands in your printer manual.

The printer command you will often want to send to your printer is the one to switch it to condensed print (17 characters per inch). If your printer is Epson compatible the code to do this is character code 15, (+O). You would send this by typing  +O  

If you use a loser printer and pages aren't fed out immediately after printing then this may be because it requires a "form feed" character to be sent to it. Type  followed by + (together) and finally . On dot matrix printers you can type  then type + (together) to repeatedly feed one line through the printer for alignment. Press  or  to finish.

P x - Partition command

bnommos tuO



The screen may be partitioned either vertically or horizontally to give 1,2, or 4 available windows and the movements of the cursor locations within these windows may be defined as synchronised or unsynchronised for both the horizontal and vertical partition. Synchronising means that movements in one window will be matched by equivalent movements in the other. Without it the inactive window will be unchanging.

The horizontal partition location can be specified by taking a number from the grid that will be displayed on the screen. The vertical partition is similarly defined. Partitions may be removed by the PE partition end command sequence.

To jump the cursor from one window to another the slash commands are used. **[?+]** will jump left to right and vice versa and the **[?]** will jump up and down between windows.

Printing a worksheet

The Notebook spreadsheet does not have a separate Print command. Printing is achieved using the Copy command to copy part or all of the sheet to a printer. See the description of the Copy command for more details.

A special destination "Mail label" can also be used to print address labels. See the tutorial for a worked example of this.

Notes: 1

- Quit command

Pressing  at the spreadsheet's main menu is the same as selecting the  - Quit command.

The Quit command clears the screen and makes a return to the previous screen of the Notebook, where you can choose to start new, list stored or print a worksheet. A copy of your current worksheet is always saved in a file RESTART.MEM. However, you should get into the habit of using the Copy command to save your work to a file you name yourself because RESTART.MEM is overwritten next time you leave the spreadsheet.

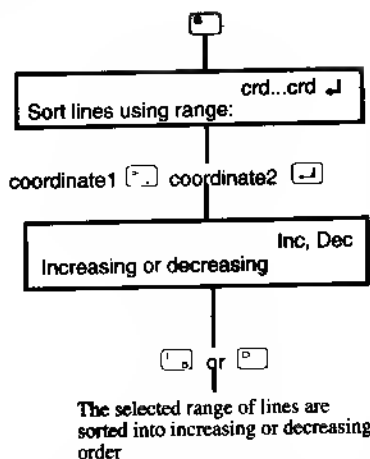
When you next use the spreadsheet you can select the Restart command to load the existing RESTART.MEM file back in and continue on from where you were last working.

Saving a file

File menu -> Save -> 

The Notebook spreadsheet does not have a separate **Save** command. This is achieved using the **Copy All to File** command. See the description of the **Copy** command for more details.

S - Sort command

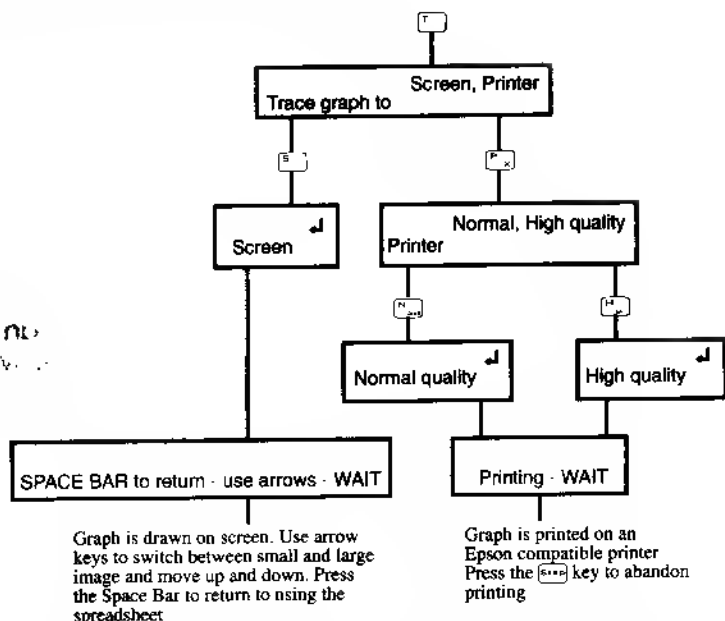


The SORT command allows sorting of lines using any specified part of any particular column as the list of items to be sorted. The sort may be by increasing or decreasing values and may be carried out on both numerical values and characters. You should avoid sorting where you have mixed formulae and constants in any column over the range or you may get very confusing results.

Note that mixing of text and numerical values in the sort should be avoided as this will give indeterminate results. Capital letters and lower case letters are taken to be of equal value. With text sorts numbers come after letters followed by blanks, punctuation marks and finally control codes. All punctuation is taken to be of equal value. Remember that any numbers that are entered as text characters can sort in unpredictable ways, for example "8" will sort as a higher value than "24".

If text or blank entries are within the specified numeric range, or vice versa, they will tend to sort to one or other end of the range.

T - Trace graph command



The Graphics features of the Notebook spreadsheet work by using a set of special functions to point to cells containing the data to be plotted and the text for the labels.

Note that where *crd* is specified in these functions you must enter a reference to a cell co-ordinate. You can't use numerical or expression equivalents except where stated.

The Trace command requires a lot of memory to prepare the image to be output and may not be available if there is not much memory left in your Notebook. You could transfer some documents / spreadsheet files to disk or another computer and then delete them to make more space. Alternatively, you could use a PCMCIA memory card to make more space available.

When you use the Trace graph command you can have the output drawn on the screen or sent to an Epson compatible printer. When the output is drawn on screen it is initially drawn so that the whole chart fits on the screen. You can switch between this and a magnified view using the [Word] and [Ctrl] keys. In the magnified view you can use the [Screen] and [Down] keys to scroll up and down.

When you output to a printer you get a choice of Normal or High Density. The former is quicker but not as detailed as the second option. (These two options use either the ESC K or ESC L sequences supported by most Epson compatible graphics printers).

When you start a Trace command the current spreadsheet is saved in the file called RESTART.MEM and then the spreadsheet draws the image in its own workspace before finally showing this on the display (or outputting to the printer). This operation takes some time. The rotating line shows that the spreadsheet is still working on the picture.

Once the picture is displayed on the screen you can press Spacebar to reload the spreadsheet data and continue working on it.

The following is a list of the functions used for building graphs. Tutorial XV explains their use in more detail.

TYPEPLOT (crd)
MAINTITLE (crd)
SUBTITLE (crd)
TIMELABEL (crd...crd)
XLABEL (crd...crd), or **XLABEL** (crd, crd, crd, etc.)
XMAXIMUM (crd)
XMINIMUM (crd)
XTITLE (crd)
XVALUE (n, crd...crd)
YMAXIMUM (crd)
YMINIMUM (crd)
YTITLE (crd)
YVALUE (n, crd...crd)

Remember that the above are functions with arguments and as such must be entered into cells that have a numerical format even if they refer to some textual data such as a label. The cell that contains the label itself must of course be set to a text format.

If any errors are encountered while using the graphics an error message will be given and a return will be made to the spreadsheet.

Limits of the graphics commands

max length	MAINTITLE	24 chars
	SUBTITLE	35
	YTITLE	25
	XTITLE	25
	TIMELABEL	16
	XLABEL	24
number of	TIMELABELs	32
	XLABELs	9 (no. of lines) possible on one chart
	YVALUES	9
	XVALUES	9

If you use lengths longer than specified above they will be truncated or ignored.

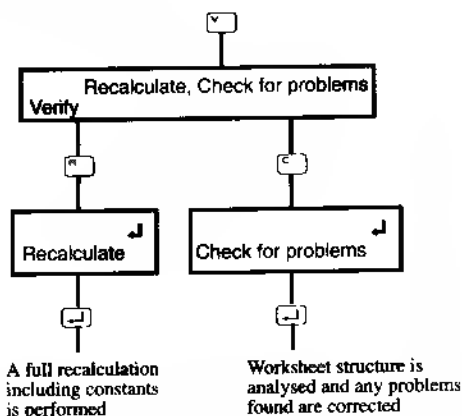
NOTE

If you do any **EDITING** of the plotting instructions or make any changes that do not force a recalculation, you may end up with an error message or values that does not seem to be true. This is most likely if you are using direct values rather than references to cell co-ordinates.

The surest way to handle plotting functions that do not contain cell references is to overwrite them rather than edit them.

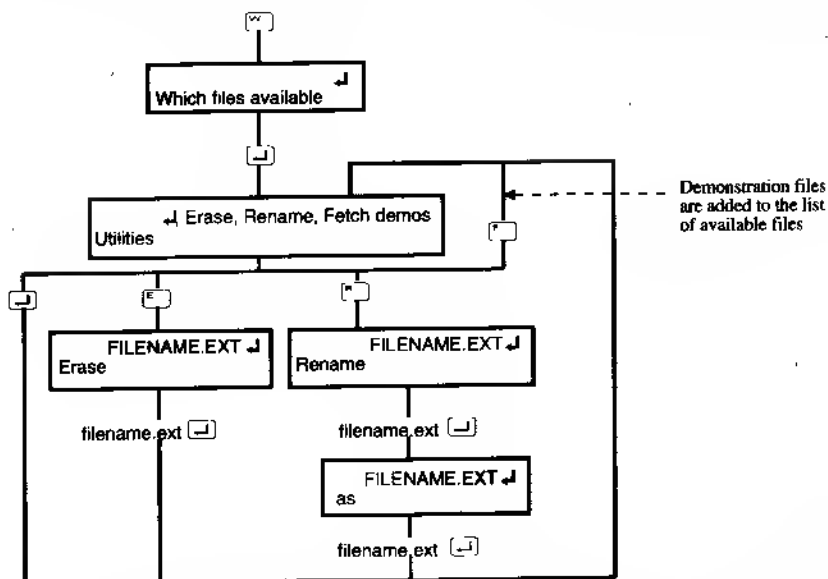
The instructions for plotting are worked out whenever a recalculation is done so if no recalculation has occurred the latest instructions may not have been properly determined. If you get such an error message just use the **!** force recalculation command and try the plot again.

- Verify command



The VERIFY command is used to cause a full recalculation including the constants within your worksheet. That is in contrast to the ! command which only recalculates expressions. Normally force a recalculation with the ! command. The Verify command is only normally used when you have brought some data into the spreadsheet from a .TXT, .DIF or .DAT file.

If you ask for "Verify Check for problems" then the structure of the worksheet will be analysed to look for inconsistencies and if any are found an attempt will be made to fix them. This is a safety precaution to ensure as much as possible that you are never left with an unworkable spreadsheet.

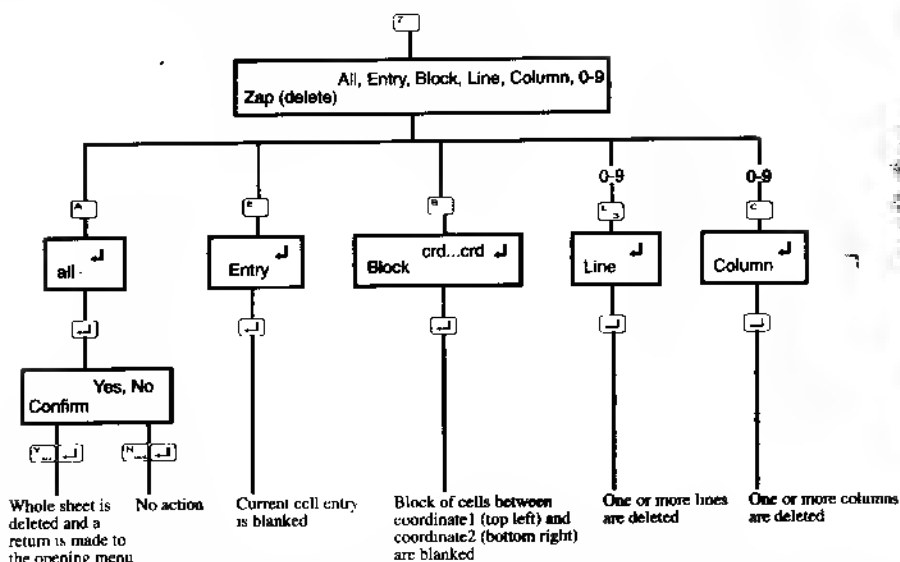


The Which files command is used to look at files associated with the Notebook spreadsheet and also to give the basic file handling operations you may want. They include erasing files, renaming files and fetching the built-in demonstration files. This allows the demos to be accessed without returning to the opening screen of the spreadsheet.

The files in the Notebooks memory will be read and all the compatible files, i.e. those that end in .MEM, .DAT, .DIF and .TXT will be displayed on the screen. After this you will be able to do any of the file management operations you want to.

[†] If memory becomes full you may be able to use the Erase function to remove some unwanted files from memory to make extra space.

Z - Zap (delete) command



Zap deletes the specified entries from memory. If the command refers to an entry or a block then the command acts just like the Blank command. For references to Line, Column, or All then the size of the worksheet is actually reduced by the command. Deleted entries CANNOT be retrieved so if in doubt first copy the worksheet to a file before embarking on complex rearrangements.

Before the deleting is carried out the program will check whether any of the items to be deleted are referred to elsewhere in the worksheet. If cross-references are found the command will stop and ask if you really want to blank the referenced items. If the cells in question remain on the sheet they will be filled with a row of '?' to signal that data is missing.

If you use the Zap All command and confirm that you want to delete everything by typing Y you will be returned to the opening menu of the spreadsheet as if you were starting from scratch.

! - Force recalculation command


CM - *

The ! force recalculation command has two main purposes: The first is to cause a calculation when the Automatic calculation is off. It is a minimum recalculation and therefore takes less time than the Verify and recalculate command.

The second usage is for solving iterative problems such as simultaneous equations or other circular reference problems. In these types of problems there may be two cells which refer to each other. Initially they cannot both be valid but on repeated recalculation they will approach true answers.

*** - Macro command**

The * Macro command is initiated by typing an asterisk, *, followed by a reference to the co-ordinate of the cell in which the Macro is stored.

The purpose of this command is to call in a predefined set of commands. Just type the appropriate key presses for your desired commands into any text format cell. Where you would want to put a  use the @ symbol. Where you want to move the cursor use U, D, L or R to move it Up, Down, Left or Right.

It is valid to finish a sequence with another Macro command or even a reference to the same macro. With a self-repeating reference you can create macros that go on repeating until an error is found.

This command is ideal for repetitive changes of format down a whole column for example. The macro NFG@D*1@ placed in cell A1 will change an occupied cell's format to general and then move the cursor down. The *1@ at the end means that it is called again and so the cell underneath it is changed and so on. This will stop when an attempt is made to change an unoccupied or text cell or if the cursor is moved outside the worksheet.

The Macro can be used to create a loop of direct commands, which differs from a loop of functions such as you may use in an expression.

More detail on spreadsheet error messages

A-Z, or 0-9

Only a letter or numeral may be used at that point.

Ambiguity (see manual)

The order of calculation number can not be resolved without ambiguity. The expression must be preceded by a reference to the cell that created the SET() to which this cell refers. The solution to this error is shown in Tutorial XVI - Table filling.

Argument too large

If calculated the EXP() of this value would be greater than 1E+38. EXP will only accept a value up to about 88.

Argument > 1.0

ASIN, ACOS, ASINR, ACOSR can only have arguments between 0 and 1.

Cannot multiple move there

There is not sufficient space at your specified destination to move this group of lines or columns.

Column first

Please insert a first column before you try to enter lines.

Comma only

You seem to have confused the layout of this function's argument.

Def function badly set up

The layout of the defined function is wrong.

Division by zero

You are trying to divide by zero which would give infinity. The Notebook spreadsheet for all its power cannot handle that. This message may appear if you have blanked some cell entries.

DO() needed with WHILE()

You cannot use the WHILE() function on its own. Part of the job it does is to seek out the DO() on the same line.

E+38 maximum

The maximum exponent that is available in the floating point numbers used in the Notebook spreadsheet is +38.

Entry too long

The maximum entry width is the free area in the middle of the entry line. This has a fixed limit of 67 characters. The error message appears if you try to type beyond this limit. The absolute maximum a cell can hold is 127 characters when loaded from a file.

ERROR called from <crd>

This is an error you yourself have called by using the ERROR() function.

FILENAME.EXT not found

The file named cannot be found in memory. Use the ☐ for Which files command to find which files are available. They are also listed when you use the Copy File command.

Function (((((5)))) max

You may only nest functions and brackets to 5 levels.

Logical expression only

The IF() function must resolve to a value of TRUE, FALSE, -1 or 0.

Missing "("

You have too many right hand brackets.

Missing ")"

You have too many left hand brackets.

Move cursor

The command you are trying to do does not make sense unless you actually move the cursor.

Must be a constant

You cannot overwrite a formula with a SET() or INIT() function.

Must be a letter

A column letter is expected.

Must be "logical" (-1 or 0)

The required argument at this point must resolve to a logical value.

Must be one of +-* / <=> % [] ! , or .

One of these operators are required.

Must not refer to this cell

The cell that contains the DO() function itself is in the range of its own argument. This is a circular call that cannot be resolved.

Negative argument

Cannot have a negative argument to a logarithm or square root.

No function "xxxxx"

This function you have entered is not one of the built in functions.

No such column

You have made a reference to a column outside the worksheet area currently defined.

No such line

You have referred to a line outside the worksheet area.

Not enough memory

There is not enough memory left to read in this file.

Not enough space

Part of your destination area would be outside the worksheet as currently defined.

Not found in this range

The LOOKUP() or INTERP() first argument was not present or enclosed by any two values in the list that you have specified.

Not in marked zone

You are trying to partition outside the area marked by a grid on the screen.

Number or value missing

With LOOKUP(), CHOOSE() and INTERP() none of the items in the list can be blank.

Odd number of values required

Simpson's rule works on an odd number of values only.

Operator at end

You cannot end an expression with an operator.

Out of memory

The memory available for entering data is all gone. Your work to date will not be damaged. Try to split your work and write an independent portion to a file so that you can later consolidate the results.

Outside worksheet

You have moved the cell cursor past the edge of the worksheet.

Reference outside worksheet

This cell reference is outside the area of the worksheet as you have currently defined it.

Result more than 1E+38

You have done a mathematical operation that gives too large a result. This is probably because of an error in one of your constants.

Second ". "

You can only have one decimal point in a number.

Separate these operators

You have two operators together. In addition, if you have two brackets together, i.e.)(then you must separate them with a ", thus)*(.

**Should be one of +-* / <=> % [] |), or **

These are the valid operators at this point.

Stack overflow, shorten entry

There are too many pending operations. Cure this by splitting the expression into two or more cells.

Text reference in an expression

In this expression you have made a cell reference to a text entry.

Text/Value change

You are trying to change a formula or constant into a text entry or vice versa. If you really want to do this, use (E) to blank the cell first.

The range must increase

Only ranges that extend over at least two columns or lines are really ranges. You see this error if the start and end coordinate are the same.

Too long

The String used by the Get command can only be 30 characters long at maximum.

Too many chars

Your filename has more than 8 characters.

Use partition first

You have used one of the slash commands before the partition has been made on which these commands work.

Worksheet too small.

You will have to expand the worksheet area before you can copy any data in from a file.

Wrong conditional layout

You have confused the layout of this conditional entry.

Wrong range layout

The way you have specified a range is not correct.

Zero argument

You cannot have a logarithm of 0.

0...9 or "."

A numeral is expected at this point (the start of an exponent)

15 sig figs max

The Notebook spreadsheet calculates to 16 or 17 significant figures but for security always rounds down to 15. You can only give 15 significant figures when entering numbers.

255 lines max

The maximum number of lines in a worksheet is 255.

38 places max

The floating point number system of the Notebook spreadsheet only goes down to E-38.

52 columns max

The maximum number of columns is 52, they are marked A-Z then a-z.

.TXT, .DIF, .DAT or .MEM

Only these file extensions are valid if you are trying to load or save a file.

"end" wrong here

It does not make sense to have "end" as the destination here.

(" or "," first

A range must always be preceded by a bracket or comma. It cannot be used as part of an expression.

cannot follow a range

You cannot get the current value of a range.

"x" is wrong after a co-ordinate

This character is not a correct following operator.

"x" is wrong here

This character is not one of the options you were offered in the prompt list.

"x" should be a numeral

Only a numeral would be valid here.

<B22> is used in <C3>

You have attempted to remove or overwrite an expression that is referred to in another expression. If you really don't mind losing the contents of the cell type Y. Blank entries will be assumed to contain zero for calculation purposes.

- %% 1 Entry destroyed in calculation
- %% 2 Column details corrupted
- %% 3 Internal coded format error
- %% 4 Entry not found to format
- %% 5 Entry not found for calc number
- %% 6 Index table corrupted
- %% 7 Main storage corrupted
- %% 8 Cannot delete index table item
- %% 9 Negative number of index entries
- %% 10 Zero length entry
- %% 11 Does not exist
- %% 12 Command corrupted
- %% 13 Memory corrupted, saved, check copy carefully
- %% 14 Opening space for index table error
- %% 15 Invalid binary number format
- %% 16 Number formatting error
- %% 17 Number formatting error
- %% 18 Number stack corrupted
- %% 19 Operator decoding error
- %% 20 System error
- %% 21 Look-ahead buffer corrupted
- %% 22 Disk write record error
- %% 23 System error

These are system error flags, that signal that a serious error has occurred in the working of the program rather than in the entry that you have typed. All being well you should never see one, however, they are the long stops in the event of system bugs. If you get one

please note the exact circumstances of how it occurred and inform your supplier. As a general rule your work will not be domoged even if you find such a bug. The Notebook spreadsheet will automatically check that your work has not been damaged. If it has then it will be filed automatically. Just press the stop key in the usual way and you will be able to carry on.

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Appendix 1

999A

Table of characters available in the Notebook

The following table shows the characters that can be used in the Notebook. The character numbers can be used when writing BASIC programs. All characters, apart from 7, 8, 9, 10, 12, 13 and 255, are available in the wordprocessor, diary, address book, etc.

DEC															
Hex Digits	0-	1-	2-	3-	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-F-
0															
1															
2															
3															
4															
5															
6															
7															
8															
9															
10															
11															
12															
13															
14															
15															

Appendix 2

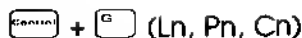
Summary of Word processor Editing Commands

Block, Copy	Function + [F2]
Block, Delete	Function + [Del]
Block, Move	Function + [F3]
Block, Mark	Function + [F4]
Centre line	Control + [N]
Clear block markers	Control + [K2]
Control codes, insert	Control + [X] (i b u c e l p q s o r t)
Control codes, show/hide	Function + [F5]
Convert to upper case	Control + [F7]
Convert to lower case	Control + [F8]
Copy default ruler (first active ruler)	Control + [D]
Copy previous ruler but one	Control + [R]
Delete all text in document	Function + [Del]
Delete one word back	[^] + [Del]
Delete one word forwards	[^] + [Del]
Delete line	Control + [F3]
Delete to start of line	Control + [Del]
Delete to end of line	Control + [Del]
Find text	Function + [F5]
Find next occurrence	Control + [F6]
Find previous occurrence	Control + [F6]
Find and Replace	Function + [F6]

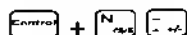
Finish what you are doing



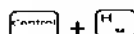
Go to specified Line,
Page or Column



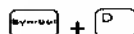
Hyphen, non-break



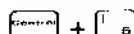
Hyphen, soft



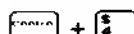
Insert date



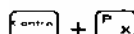
Insert line



Insert on/off



Insert page break



Insert special character



highlight symbol then press

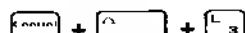
Insert time



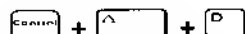
Justification on/off



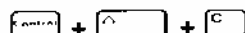
Line drawing on/off



Line drawing, double



Line drawing, select character



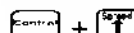
Macro, use a



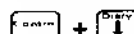
Markers, insert or go to



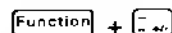
Move back 6 lines



Move forward 6 lines



Move block



Move to start of marked block



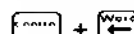
Move to end of marked block



Move to end of line



Move to start of line



Move to start of next line



Move to end of document	Control + []
Move to start of document	Control + [] %
Move to last position	Control + [] 3
Move to next tab	^ + []
Move one page back	Control + [] 9 9
Move one page forward	Control + [] 0 +
Move back one paragraph	Control + [] ←
Move forward one paragraph	Control + [] →
Move back one word	^ + [] Word ←
Move forward one word	^ + [] Word →
Multiple markers, insert	Control + [] ✓ []
Multiple markers, go to	Control + [] ([] forwards [] back)
Non-break hyphen	Control + [] N []
Non-break space	Control + [] N [] <spacebar>
Program mode - absolute line/ character number display.	Control + [] + [] P []
Ruler line, Show	Control + [] V [] R
Ruler line, switch to default	Control + [] D
Ruler line, copy previous	Control + [] R
Soft hyphen	Control + [] H
Space, Insert	Control + []
Space, non-break	Control + [] N [] <spacebar>
Spaces, show/hide	Control + [] V [] S
Spell check document	Function [] 1
Spell check from cursor	Control + [] S

Spell check word

Esc + F1

Status line, on/off

Function F9

Swap (transpose)
two characters

Control + A

Tabs and returns, show/hide

Control + V T

Undo last block/line
delete operation

Control + U 4

Word count


Control + W



































































Word wrap on/off

Control + W




















































































Appendix 3

Display of Macro definitions

When the display macros command is used you will see the various  keys that have been assigned. Any characters in the table shown in Appendix 1 will appear normally but in addition to this you may see numbers contained within ^ characters. There is a number for each possible function in the word processor. The following is a list of those numbers and what they mean together with the key combination that is used to achieve the function.

Number	Keys used	Description
512	 	Set or go to marker
513	 	Swap adjacent characters
515	 	Centre line
	 	
516	 	Default ruler
517	 	Delete to end of line
	 	
518	 	Format paragraph
519	 	Go to column, line or page
521	  	Insert line
522	  	Justify on/off
523	  	Clear block markers
524	  	Go to last position
525	  	Move block
	  	
526	 	Non break character
528	  	Line/Character number display
529	 	Spell check single word
	 	
530	 	Insert previous ruler line
531	 	Spell check from cursor
533	  	Undelete block
534	 	Various view options
535	 	Word wrap on/off
536	 	Enter control code
538	 	Set block marker
	  	
539	  	Move to start of document

540	Control I	Convert to lower case
541	Control J	Move to end of document
545	Del	Delete forwards
639	Shift Del	Delete backwards
722	Function Del	Delete all text
723	Control Shift Del	Delete word backwards
724	Control Home	Delete to start of line
727	Control ^ End	Go to next marker
728	Control ^ %B	Go to previous marker
729	Control %B	Previous find
730	Control C	Back one paragraph
731	Control F	Forwards one paragraph
732	Control Shift B	Back one page
733	Control Shift F	Forward one page
736	Control %B	Find next
737	Control %4	Insert on/off
739	Control H	Soft hyphen
740	Control Shift Tab	Move to next tab
741	Control Del	Delete word right
742	Control C	Delete line
743	Control F	Convert to upper case
744	Function Del	Delete block
746	Function Shift Del	Copy block
747	Control <spacebar>	Insert space
748	Control Shift Enter	Move to start of next line
752	Space	Cursor up
753	Down	Cursor down
754	Word Left	Cursor left
755	Word Right	Cursor right
756	Control Shift Up	Scroll up one line
757	Control Shift Down	Scroll down one line
758	Control Shift Word Left	Move word left
759	Control Shift Word Right	Move word right
762	Control Word Left	Move to start of line
763	Control Word Right	Move to end of line
764	Tab	Back out one level
774	Macro M D	Record macro
776	Control ^ L	Line drawing mode on/off
777	Control ^ C	Select line drawing character
788	System D	Current date
789	System T	Current time

834	  	Insert bold code
835	  	Insert condensed code
837	  	Insert elite code
841	  	Insert italic code
843	  	Insert enlarged code
848	  	Insert proportional code
849	  	Insert quality code
851	  	Insert subscript code
852	  	Insert superscript code
853	  	Insert underline code
915	  	Choose character
919	  	Print block
922	  	Remove word from user dictionary
931	  	Display user dictionary
932	  	Word Count
933	  	Count words in black
938	  	Non break hyphen
939	  	Non break space
940	  	Insert multiple marker
942	 	Function key pressed
973	  	View codes on/off
974	  	Status line on/off
983	  	Display macros
984	  	Create header
985	  	Create footer
987	  	Print to screen
990	  	Insert page break
991	  	Format text

Appendix 4


Serial Terminal - VT52 emulator






When you are using the serial terminal program built into the Notebook it emulates a DEC VT52 type of terminal. If the computer to which you are connected can send VT52 codes these will be acted upon by the serial terminal program. The VT52 codes that the terminal program will respond to or send are:

ESC A	moves the cursor up one line, stopping at the top margin.
ESC B	moves the cursor down one line, stopping at the bottom margin.
ESC C	moves the cursor one column to the right, stopping at the right margin.
ESC D	moves the cursor one column to the left, stopping at the right margin.
ESC H	moves the cursor to the home position.
ESC Y/c	moves the cursor to the specified line and column.
ESC K	erase all characters from the current cursor position to the end of the current line.
ESC J	erase all characters from the current cursor position to the end of the screen.
ESC I	move the cursor up one line, scrolling the screen if the cursor is at the top margin. The new top line is filled with spaces.
ESC Z	on receiving this code the Notebook will send back ESC / Z to identify it as a VT52 compatible terminal.
ESC 7	saves the current cursor position.
ESC 8	returns to the previously saved cursor position.

The following ASCII characters are treated in a special way by the serial terminal program:

NUL 0	ignored.
ENQ 5	transmits answerback message - "Amstrad NC200".
BEL 7	generates bell tone.
BS 8	moves the cursor left one character; if the cursor is at the left margin, character is ignored.
HT 9	moves the cursor to the next tab stop, or to the right margin if there are no more tab stops.
LF 10	moves the cursor down one line, scrolling the screen if the cursor is at the bottom margin.
VT 11	processed as LF.
FF 12	processed as LF.
CR 13	moves the cursor to the left margin on the current line (also performs LF if "Add linefeed" option is set).
DC1 17	processed as XON, causing the terminal to continue transmitting characters.
DC3 19	processed as XOFF, causing the terminal to stop transmitting characters except XON or XOFF.
ESC 27	begins an "escape" sequence as described in the table on the previous page.

Most keys on the keyboard will send their standard ASCII code when pressed. The cursor control keys will be changed to their respective VT52 "escape" sequences. The Notebook specific keys will not transmit any characters. The  key will either send CR or CR, LF depending on the setting of "Add linefeed".

The PF1 to PF4 codes generated by a standard VT52 terminal can be typed by holding down  and pressing , ,  or . These send the corresponding "escape" sequences - ESC P, ESC Q, ESC R or ESC S.

The terminal will always check the state of the CTS signal on the RS232 port before transmitting a character. If the signal is in the

"hold" state, the terminal will not transmit the character. If the terminal is prevented from transmitting characters for long enough its own output buffer becomes full. In this case it will refuse to accept any further characters to transmit and will display a "communications failure" message.

The terminal maintains the RTS signal in the "active" state provided it is able to store characters in its own internal buffer. If the buffer becomes full it will put the RTS line into the "hold" state until it can accept a character.

Both the internal buffers for transmit and receive are 256 bytes long.

The XON/XOFF software flow control protocol works as follows: If the terminal receives an XOFF character the terminal will stop transmission of any characters except XON/XOFF within one character of receiving the XOFF.

If the terminal then receives the XON character it will continue transmission of all characters.

When the internal receive buffer becomes two thirds full (at 170 characters) it will send an XOFF character. If characters continue to build up within the buffer a further XOFF character will be sent when the buffer holds 200 characters. If characters continue to build up within the buffer an XOFF character will be sent for every character received after 240.

When the internal buffer becomes one third full (at 85 characters) the terminal will send an XON character if an XOFF had previously been sent.

The hardware handshaking (CTS/RTS) will always have priority when determining the transmission of characters.

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Troubleshooting

If you have difficulties when using your Natebook there is a good possibility that your question may be answered in the following list of common questions and answers, many of these are based on calls received about the NC100 and NC150 Notepad computers.

I switch on but nothing shows on the screen.

- Check that batteries are installed.
- Adjust the brightness (contrast) control.
- If using batteries disconnect AC Adaptor from Natebook.
- If using mains power check AC adaptor is connected properly.

The Notebook switches itself off when I'm not looking.
This is a normal feature, designed to help conserve your batteries, you can adjust the time delay before power off

I have set a password but forgotten it, what do I do?

You must delete the current password and secret information. Refer to "If you forget your password" in the user guide. If you've used the password to operate the complete "lock" then the whole machine must be reset as described in "Hard reset" below.

I think my Notebook is running out of memory, what do I do?
Copy some of your old documents to disk then delete them from memory.

Is there anything I can do to increase the memory?

Standard JEIDA/PCMCIA Memory Cards will expand the Memory by up to 1MB

Where can I buy memory cards?

Memory cards in sizes from 64KB up to 1MB are available from the following address (telephone credit card orders can be made):

Amstrad Spares Dept.
169 Kings Road
BRENTWOOD
CM14 4EG

Tel: 0277 209509

Can I use a monitor or TV with the Natebook?

No, this is not possible.

Sometimes when I'm typing a document or worksheet, it disappears and other things appear on the screen.

You have accidentally invoked a command, possibly by pressing **[Function]** instead of **[^]** or **[Enter]**. Press **[Function]** **[Word]** or **[Function]** **[Page]** to return to what you were doing. In the spreadsheet select the Restort option to continue where you left off..

I can't print \$ signs on my printer

1) Make sure you have set the Notebook for the correct sort of Printer (**[Function]** **[P x]** then **[Function]** **[Printer]**)

2) Make sure your printer and Notebook are set to use the same character set before you print. The IBM set will give you the largest range of characters (possibly including box symbols), however you may not get italic characters printed. The Epson set may limit the range of characters but should always enable italics.

I can't get italics to print

Some printers (such as the original Canon BJ10e) simply don't support printing in italics.

If you are sure that your printer can print italics read the above answer about printing \$ signs.

How do I run a macro?

Just hold down **[Symbol]** and press the letter key that you assigned the macro to.

How do I reset the macros?

You can only redefine each macro individually back to the value shown in the table in the Macro chapter. You can use the soft reset method (described below in "When all else fails!") to reset all the macros in a single operation but all Notebook settings will also be set back to their factory default.

How can you adjust line spacing on a printout?

There are two ways to do this. While editing a document press **[Function]** **[L 7]** to access the layout menu then set the bottom **Line spacing** option to $\frac{1}{2}$, 1, $1\frac{1}{2}$, 2, $2\frac{1}{2}$ or 3. This will affect all documents that you write from now on. If you just want a single document to have an unusual line spacing put a ">LS" code at the start of the document (see the chapter on Stored Commands).

How do I get page numbers printed?

Automatic page numbers can only be used in headers and footers. Where you put a % symbol in a header/footer it will be filled in with the page number when the document is printed. Headers/footers can be inserted manually with a >HE or >FO code or use the create options in the word processor menu (press **[F10]** while editing).

How do I turn off right justification so that the right margin of the text isn't always straight?

For a single document just press **[Control][J]**, press again to switch it on. If you have the status line showing (**[Function][8]**) the letters **RJ** show when it is on. To disable it for new documents, use the configure menu (**[Function][E]**) and set the **Right justify** option to **off**.

How do I print selected pages?

At the list of documents to print press **[Control][Space]** and use the **Start at..** and **End at..** options to select the pages to print.

How do I get back deleted files?

You simply cannot. Once a file is deleted it is gone for good. If you think you may lose something because of this always copy your complete list of documents to a floppy disk before deleting any.

How do I store the Address Book on a memory card?

Put in the card, switch on, press **[Function][P]** to switch to the address book then immediately press **[Stop]**. At that moment the address book is written on the card.

How do I change the printed page length

To change all subsequent documents press **[Function][7]** while editing and change the **Page length** entry. If you just want to change it for a single document put a >PL stored command at the top of the document (see section on Stored Commands).

How do I print multiple copies?

Put on >NC stored command in your document followed by the number to be printed (see section on Stored Commands).



Can I use an Amstrad PCW printer?

Apart from the Canon BJ10 printer supplied with some PCWs it is not possible to directly connect a PCW printer to the Notebook because, unlike most printers, the PCW printer has its "intelligent electronics" inside the main PCW unit. You could, however, transfer documents to the PCW and then print them either from LocoScript (import ASCII files) or use the CP/M version of Protext.

How can I easily transfer documents to an Amstrad PCW?

By far the simplest way to do this is to use the "Lapcat" cable and software that is available from Arnar. You may also need a serial/Centronics interface to connect to the PCW.



How do I get condensed printing?

Like all styles in the word processor you can put in a code to switch on condensed printing by pressing   in the editor and select the C - **Condensed** (or any other) option. Put in a second code to switch back to normal. For this to work your printer must, obviously, support condensed printing and you must have set the correct **Printer** option in the Print Options menu.

How do I change the margins?

Margins are changed using ruler lines. A letter L is used to show the position of an indented Left margin and a letter R is used to set the Right margin. See the section on "Aligning text using Ruler Lines".

How do I indent a paragraph?

Use a ruler line with an L showing where the left margin of the subsequent paragraph should be. Switch back to the previous margins after this by pressing  to insert the previous ruler line. For paragraph numbers move the cursor into the left margin space, type a number and then  to continue the paragraph.

Can I print the secret information?

No, as a security measure it is not possible to print this. You should consider just entering the information as a normal document if you really intend to print it.

What is the size of the "user dictionary" and macros?

The dictionary is 1KB, 1024 characters, which will hold about 150 average length words. There are 256 characters for macros.

What printer lead do I require?

If using the parallel port the lead is exactly the same as used for an IBM PC compatible printer. Almost all printers are already supplied with such a lead. For serial printers see the diagrams in the section that describes Sending and Receiving files.


I get "Mistake" errors whenever I try to type commands in BASIC

Caps Lock should normally be switched on when using BASIC as all commands must be typed in upper case.

The calculator does not work in the same way as my pocket calculator

There is no single standard for how a calculator should work, some pocket calculators do work like this.

What on Earth does ABCDEFGHIJKLMNOPQRSTUVWXYZ!+-\/>.('* mean?

This shows you all the keys you can press at the main menu of the spreadsheet. Because there are so many commands, only the first letter of each is given. As always in the spreadsheet, you can press  to get detailed help on this.







Everytime I press  in the Spreadsheet I get the message "Space full"

Press the space bar then use the Which files command to list other sheets in memory. Erase old ones to make space. In the limit you may have to remove data from the spreadsheet to make room.






After printing from the spreadsheet my laser does not feed a page, what should I do?

Type  then press  together, finally press  or .

I want to enable NLQ printing from within the spreadsheet

This depends on the printer you have - check its manual for details but, if it is Epson compatible, the code to enable NLQ is "Esc x 1". So type  then press  together (which sends "Esc"), then press  then , finally press  or .

How do I align the paper in my printer before printing a worksheet?

Type  then hold down  and press  as many times as necessary, finally press  or .

Graphs from the spreadsheet don't fit on a sheet of A4 paper in my 24 pin printer - what should I do?

This is because the graphic dots printed on a 24 pin printer are larger than on a 9 pin printer. However, the printout will fit if you start printing right at the top of the page and use the printer's DIP switch settings to make it ignore the out of paper sensor.

When all else fails!

If, while using your Notebook, it simply refuses to respond to key presses or appears to be behaving in an unexpected way there is a special key sequence that can be used to reset it. This is known as a "soft reset". This will keep all your documents, worksheets,

address book, etc. intact but will set all **system settings** and menu choices back to their factory settings.

Soft Reset: If possible, before switching off, finish what you are doing by pressing **[stop]** (otherwise your current work in document or address book will be lost) then hold down **[Function]** and **[stop]** together and switch the Notebook on, you will hear a high pitched "beep" if the reset is successful.

If the machine still refuses to work correctly there is a more powerful reset mechanism known as a "hard reset". However, **be warned**, this will erase absolutely everything stored in the Notebook and is only provide as an absolute last resort when all else has failed.

Hard reset: Switch off the Notebook then hold down the **[Function]** **[stop]** and **[on]** keys and switch on. You will hear a low pitched "beep" and the machine will be completely reset to exactly the same state as when you first bought it.

Memory usage in the Notebook

As you create documents and worksheets and make diary and address book entries there are three areas of memory in which the Notebook can store the information you type. These areas are the Lower Memory, the Upper Memory and the Card Memory - if a PCMCIA card is fitted.

If you switch **Document sizes and date display** on in the system settings menu you will see that each file in the List Stored Documents screen has an L, U or C beside it showing where it is stored.

The Notebook has 128K (131,072 bytes) of memory as supplied. It uses 20,200 bytes of this for its own operation (including 8,192 for the screen memory). The remainder appears as two separate areas. The Upper Memory is about 72,704 bytes while the remainder (38,184 bytes) forms the Lower Memory area.

Whenever you edit a document it must be loaded into the Lower Memory while editing, this is why the maximum size of document you could ever edit is limited to 38K. When you press **[stop]**, if there is sufficient room, it will be stored away in the Upper Memory when you finish editing. If there is not sufficient room in Upper Memory, documents will be stored in Lower Memory but this reduces the amount of free space available for editing new documents.

If you receive the **Memory is full** message you should copy to disk and then try to delete some old documents, old worksheets or remove old entries from your address book and diary. You can increase the available memory by adding a PCMCIA static RAM card. If you have a RAM card, then documents will always be stored on that while there is room and it is write enabled. However when a document on a card is edited it must be loaded into the Lower Memory while you work on it so that limits the maximum size of document you could possibly ever edit to about 38K.

When you start BASIC it also takes as much of the free space in Lower Memory as it can for its own program memory. When you SAVE programs they will be stored on the card (if fitted), then in Upper Memory (if they will fit) or in Lower Memory otherwise.

When you start the spreadsheet all documents in memory are reorganised to see if a full 64K of Upper Memory can be made available (that's what happens when it prints "Preparing memory"). If 64K in Upper can be made available the spreadsheet starts with the maximum amount of memory available which gives you about 32,000 bytes to hold data (plus another 12,800 bytes used for indices). The spreadsheet shows you how much memory is available on its status line. Its ☐ command can be used to show how much memory is available for index information, press ☐ to see the figure.

If 64K of Upper Memory is not available when the spreadsheet started it will start with just over 20,000 bytes for data and 8,500 for index information. If memory is severely limited there will only be about 8,000 bytes for data and 4,700 bytes for index information. In these last two cases the Trace Graph function cannot be used.

When you have a memory card and run the spreadsheet documents in memory (that will fit) are copied to the card. It almost always ensures that the spreadsheet starts with as much memory as possible and its graphics functions can, therefore, be used.

Hotline Support

If, on unpacking your Notebook, it will not function at all it should be returned immediately to your dealer for replacement.

As the Notebook is a very sophisticated item, you may find you need personal assistance when learning how to use it that a user guide cannot provide; our Hotline Support can provide further tuition. Dial the Hotline Support on **0891 808181.***

From September to the end of January:

Monday - Friday	9.00 am - 8.00 pm
Saturday	10.00 am - 7.00 pm
Sunday	11.00 am - 5.00 pm

All other times of year:

Monday - Friday 9.00 am - 5.00 pm

**Because the hotline is an additional tutorial service the calls are charged at the Premium Rate. At the time of printing the Premium Rates are 48 pence per minute at peak times and 36 pence off-peak.*

Note: We have analysed many thousands of calls received about the predecessors of the NC200 Notebook - the NC100 and NC150 Notepads. From this we can see that the same questions re-occur many times. That information has been used to improve this manual and the most common questions have been included in the Troubleshooting section on the previous pages. It is well worth looking through that list before calling us as there is a strong chance that your question will be answered there.

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All correspondence relating to the product or this manual should be addressed to:

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NC200 1st Edition

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Proximity Technology, Inc

Project management by Cliff Lawson and Bill Edwards.

BASIC written by Richard Russell

Terminal and disk software written by Ranger Computers Ltd.

Spreadsheet software written by Ian W Searle.

All other software designed by Alan Sugar, Cliff Lawson and Arnor Ltd and written by Arnor Ltd.

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